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Rock Products

DEVOTED TO THE PRODUCTION
OF ROCK AND ITS PRODUCTS

Vol. V. No. 4.

LOUISVILLE, KY., JANUARY 22, 1906.

MANUFACTURED PRODUCTS
AND CONCRETE EDITION

SAND LIME BRICK MACHINERY

NATIONAL SYSTEM

FINLAY SAND DRYER

CLAY WORKING MACHINERY

LIME HYDRATING PLANTS

NATIONAL BRICK MACHINERY CO., 817 Chamber of Commerce, Chicago

DRY UP YOUR TROUBLES

WITH OUR

Drying Machinery and Presses

THE BILES DRIER COMPANY

Both Long Distance Telephones

LOUISVILLE, KENTUCKY

Expert advice in Construction and Operation of

SAND LIME BRICK FACTORIES

PLANS, SPECIFICATIONS and PERSONAL ATTENTION GIVEN YOUR LOCATION BY

W. J. CARMICHAEL, - - - WELLSBURG, W. VA.

CAPACITY, 60,000 PER DAY.

UNION MINING COMPANY,

ESTABLISHED, 1841.

MANUFACTURERS OF THE "MOUNT SAVAGE" FIRE BRICK

CELEBRATED

DEVOTE A SPECIAL DEPARTMENT

to the Manufacture of Brick particularly adapted both physically and chemically to

Large Stock Carried. Prompt Shipments Made.

Lime Kiln and Cement Kiln Construction. Write for Quotations on Standard and Special Shapes, to

UNION MINING COMPANY, Mount Savage, Md.

"Howard Cement"

IT IS NON-STAINING.
IT IS WHITE.

IT IS NON-FREEZING.

HOWARD CEMENT PLASTER the most perfect wall plaster made

Favor us with
your inquiries.

Howard Hydraulic Cement Co.

CEMENT,
GEORGIA.



Phoenix Portland Cement UNEXCELLED FOR ALL USES.

Manufactured by

PHOENIX CEMENT CO.

NAZARETH, PA.

Sole Selling Agent WM. G. HARTRANFT, Real Estate Trust Building,
PHILADELPHIA, PENNSYLVANIA

"RELIANCE" BELT ABSOLUTELY BEST

FOR GRIFFEN MILLS
FOR TUBE MILLS
FOR BALL MILLS

Chicago Belting Company

MAKERS

67-69 South Canal Street,

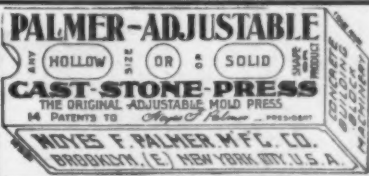
SEND US YOUR SPECIFICATIONS.

CHICAGO, ILL.

THE QUEEN'S RUN FIRE BRICK CO.

Highest Grade
Shapes a Specialty.

LOCK HAVEN, PENNSYLVANIA



Dryers for Sand for Sand Lime Brick
ALSO FOR CLAY, COAL, ETC.

Write For Catalog P. R.

American Process Company

62-4 Williams St., New York City.



MARQUETTE PORTLAND CEMENT

Gives Absolute Satisfaction for All Kinds of Concrete Work.

MARQUETTE CEMENT MANUFACTURING CO.,

MILLS: LA SALLE, ILL.

SALES DEPARTMENT: MARQUETTE BLDG., CHICAGO.

Buckeye Portland Cement Co.

ESTABLISHED 1888.

Manufacturers of the celebrated
"Buckeye" brand of

Portland Cement

"Buckeye" has stood the wear and tear in many important places for the past fifteen years and under the new process of manufacture is now better than ever. :: :: :: :: ::

WE INVITE YOUR
CORRESPONDENCE.

Bellefontaine, Ohio.

It Doesn't Stain Bedford Stone



Chattanooga, Tenn., Sept. 6, 1906.

This is to certify, that we have used **HYDRATED PORTLAND LIME** in setting Bedford Stone on the R. S. Faxon residence, Bluff, View, and that we find it perfectly satisfactory in every respect.

Respectfully,

F. A. SUTLIFF, Supt. Masonry.

—WRITE FOR PRICES—

CHICKAMAUGA CEMENT CO.

CHATTANOOGA

TENNESSEE



"LIMOID"

SEWER PIPE
FIRE BRICK
PLASTER, ETC.

Charles Warner Company

LAND TITLE BUILDING,
PHILADELPHIA.WILMINGTON,
DELAWARE.A
STANDARD
PORTLANDFOR
UNIVERSAL
USE

CEMENT DEPARTMENT.

ILLINOIS STEEL COMPANY,

The Rookery,

CHICAGO, ILL.

Chicago Portland Cement Co.



MANUFACTURER OF...

"CHICAGO AA" PORTLAND CEMENT.

We make one brand only.

The best that can be made.



ONE GRADE—ONE BRAND.

The Recognized Standard American Brand.

General Offices: EASTON, PA.

SALES OFFICES:

541 Wood, PITTSBURGH.

Builders Exchange, BALTIMORE.

Marquette Building, CHICAGO.

Builders Exchange, BUFFALO.

Board of Trade Bldg., BOSTON.

Park Row Bldg., NEW YORK.

Harrison Building, PHILADELPHIA.



Manufacturers: Sales Office, Holland Building. St. Louis.

The Best Portland Cement Is

"LEHIGH"

MANUFACTURED BY

Lehigh Portland Cement Co.

ALLENTOWN, PA.



Write for Catalogue.

Capacity, 4,000,000 Yearly.

Tell 'em you saw it in ROCK PRODUCTS.



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Rock Products

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OF ROCK AND ITS PRODUCTS

Vol. V. No. 4.

LOUISVILLE, KY., JANUARY 22, 1906.

MANUFACTURED PRODUCTS
AND CONCRETE EDITION

AT MILWAUKEE

The Second Annual Convention of the
National Association of Cement
Users was a Great Success.

MILWAUKEE, WIS., January 12.—The second annual convention of the National Association of Cement Users adjourned at 6:30 this evening, after a most interesting and encouraging three days convention, comprising nine sessions in all, one of which was a social feature given to the delegates by the Milwaukee local committee and the cement interests of the city. The total registered attendance was six hundred and seventy-six, but in all probability there were fully two hundred visitors who failed to register, but who were on hand for the purpose of investigating the condition of the concrete industry to keep in line with the great march of progress which surrounds the central idea of cement construction. Had it not been for the conflicting information with regard to the place for holding this convention it is certain that the attendance would have been more than one thousand, for a large number of our readers living in remote parts of the country who fully intended to come to this convention were unable to get satisfactory advice early enough to purchase their tickets and to these parties the rebate feature was a big consideration.

It was unfortunate that the conflicting reports were issued so strenuously at a time so near to the date of the convention. The Milwaukee local committee are to be congratulated upon the able manner and untiring efforts with which they contributed to the comfort and accommodation of the visitors.

The management of the Republican House, the official headquarters of the convention, deserve a vote of thanks for their patience and courtesy in accommodating such a large number of guests.

The exhibit feature of the convention was very large, completely filling all the space of two large buildings besides the side walks and the buildings across the streets from the main hall. From an educational standpoint this convention was a great success. There was no session which was not largely attended and the interest in the discussion was intense throughout. The progress that the industry has made since the convention one year ago at Indianapolis, is almost beyond comprehension. The systems and methods, which were more or less conjectural at that time, are to-day transformed into facts, and most of the evidence offered was the testimony of practical men and not the views of theorists.

AFTERNOON SESSION, JANUARY 9th.

President Richard L. Humphrey called the convention to order promptly at 3 o'clock and made a very short address to the assembled delegates in which he congratulated the association upon the evident progress achieved in the industry since the organization at Indianapolis one year ago. These remarks were well received and evoked applause. The president stated that the reports of the various committees would be offered to-morrow and then the program was begun which started with a paper by Mr. Sanford E. Thompson, entitled, "Concrete Aggregates," which, on account of the absence of Mr. Thompson, was read by Secretary Charles C. Brown, as follows:

CONCRETE AGGREGATES.

BY SANFORD E. THOMPSON, ASSO. M. AM. SOC. C. E.

The term "aggregate" includes not only the stone but also the sand which is mixed with cement to form either concrete or mortar; in other words, it is the entire inert mineral material. This definition, now generally accepted, has replaced the one

restricting the term to the coarse aggregate alone.

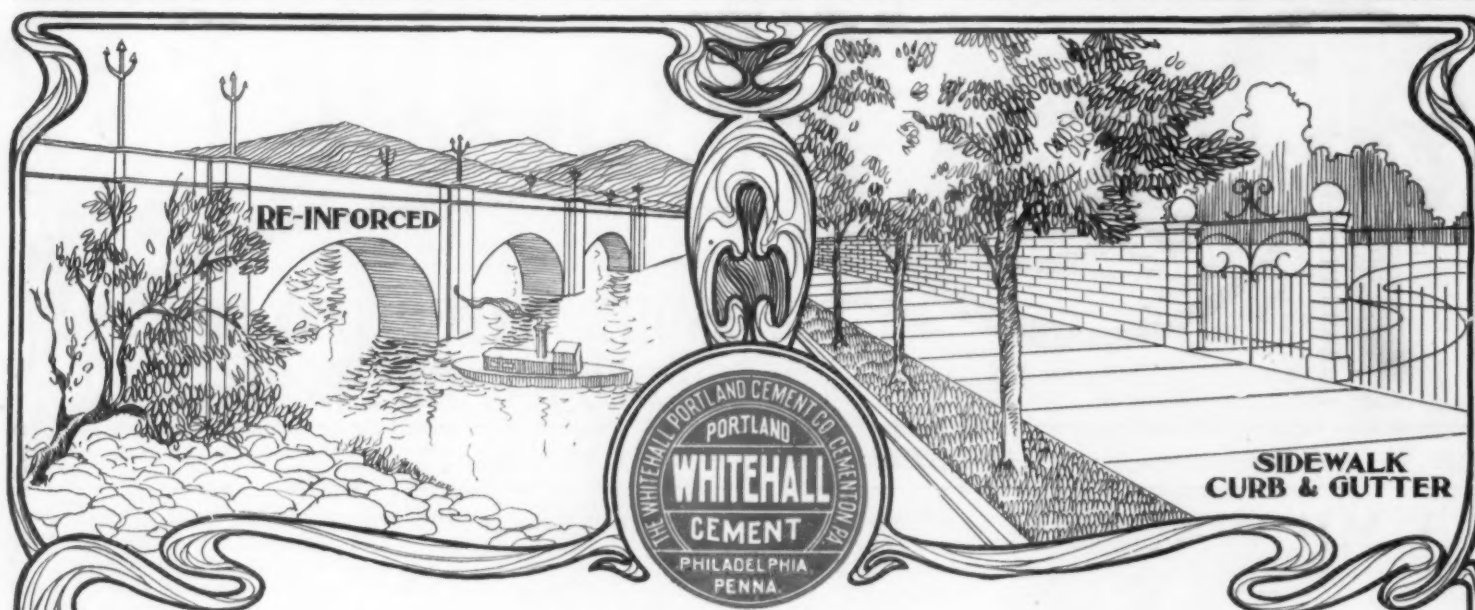
It is the object of this paper to enumerate briefly the general principles which should be followed in the selection of sand and stone for mortar and concrete, and to briefly describe the method of testing aggregates and determining proportions which the author has found to give good results in practice.

At the outset it may be said that a concrete of fair quality, if rich enough in cement, can be made with nearly any kind of mineral aggregate, but there is nevertheless a wide variation in the results produced. For the fine aggregate, sand; broken stone screenings pulverized slag, or the fine material from cinders may be used, separately, or in combination with each other. For the coarse aggregate, broken stone, gravel, screened gravel, slag, crushed lava, shells, broken brick, or mixture of any of these may be employed. However, the very fact of the adaptability of concrete to so wide a range of materials, every one of which really consists of a large class varying in size, shape and composition, tends to blind one to the economics

Continued on Page 36.



THE SPIRIT OF THE CONVENTION.



1

The Number of
Re-Inforced concrete Bridges
Built With

Whitehall Portland Cement
Reflects Greatly to its Credit.

3

For Re-Inforced Concrete Steel Chimneys
Whitehall Portland,
Has the Enormous Strength
Which is so Essential.

4

Architects and Engineers Constantly Favor
Whitehall Portland
On Account of its Wonderfully
Uniform Quality.

5 CARDINAL POINTS

....ABOUT....

WHITEHALL PORTLAND CEMENT

2

Sidewalks, Curbing and Gutter Work
When Done With

Whitehall Portland
Require no Further Attention.
Once Done, Forever Finished.

PRINCIPAL SALES OFFICE OF

The Whitehall Portland Cement Company

1719-1723 Land Title Building,
PHILADELPHIA, PA.

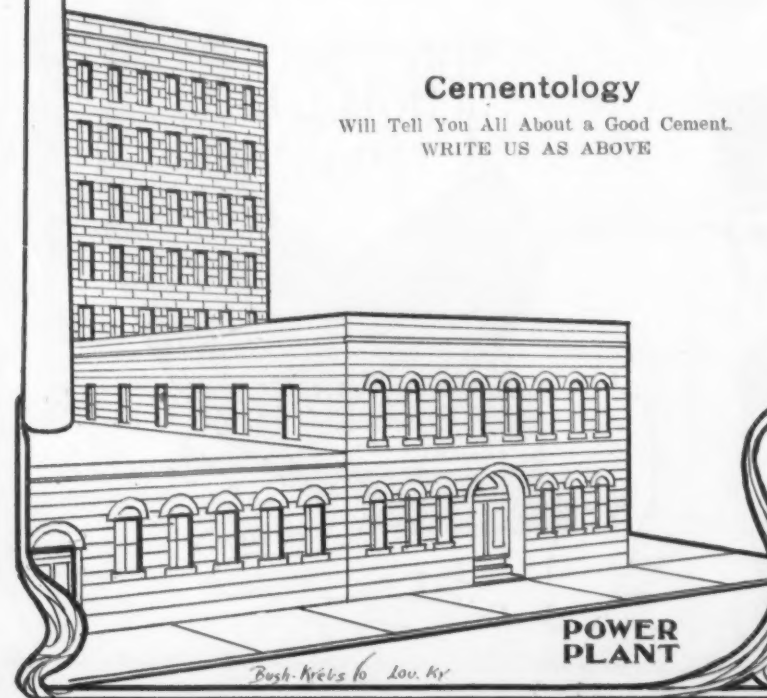
Cementology

Will Tell You All About a Good Cement.
WRITE US AS ABOVE

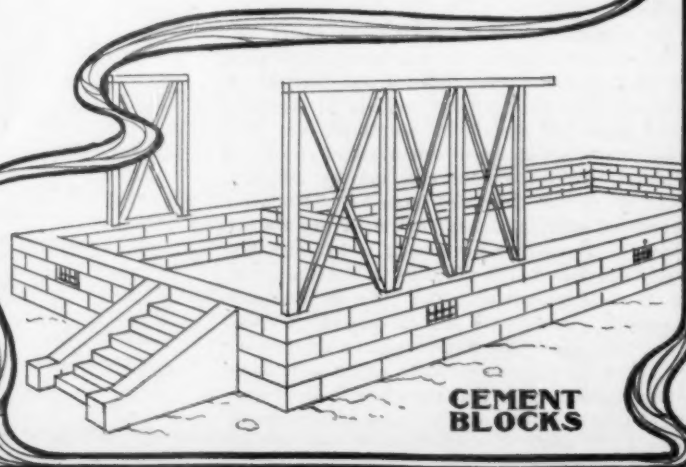
5

The Ideal Light Colored Cement Building Block
Is Obtained by the Use of

Whitehall Portland.



**POWER
PLANT**



**CEMENT
BLOCKS**

Tell 'em you saw it in ROCK PRODUCTS.

"KOSMOS"

Kosmos Portland Cement is the product of a model plant, using high grade raw materials and under the direction of a staff of experienced cement engineers.

It is guaranteed the equal of any American Brand of Portland Cement and will be found to run uniform



in color, strength and fineness. It is suitable for any class of work and is especially recommended where the requirements are exacting.

Manufactured by the

KOSMOS PORTLAND CEMENT CO., Inc.,

BUSINESS OFFICE: 53-54 Todd Building, Louisville, Ky. WORKS: Kosmosdale, Jefferson Co., Ky.

Louisville Hydraulic Cement.

The best work is the kind that accomplishes all the objects sought at least expense.

Mr. Chas. Hermany, Past President Am. Soc. C. E., says in a letter dated July 4, 1901:

"For many classes of public works Louisville natural cement is as good and reliable as Portland cement, and at a greatly reduced cost in the construction of concrete masonry."

Over 36,000,000 barrels that have gone into actual use attest its merit.

Special slow-setting cement for brick and stone masonry when desired.

Illustrated pamphlets mailed on application.

Western Cement Co.

281 W. Main Street,

Louisville, Ky.

BANNER CEMENT CO., MAKERS OF THE FAMOUS BANNER BRAND OF LOUISVILLE CEMENT.

Guaranteed that 90 per cent. will pass a ten thousand Mesh Sieve.

WE SELL TO DEALERS ONLY.

GENERAL OFFICE: MASONIC TEMPLE, CHICAGO, ILL.

Newaygo Portland Cement Co.

Sales Office: Michigan Trust Building,
GRAND RAPIDS, MICH.

Write us for prices. Send us your orders.

CHARLES W. GOETZ LIME & CEMENT CO.

MANUFACTURERS OF AND DEALERS IN

Glenwood Lime, Banner Brand Louisville Cement, Portland Cements and Building Materials.

St. Louis, Mo.

WESTERN LIME & CEMENT CO., MILWAUKEE, WIS.

Largest Manufacturers of Magnesian White Lime in the United States. Daily capacity, 10,000 Bbls.

Exclusive Northwestern Distributing Agents.

For all the best Lehigh Valley, Pennsylvania, Brands of Portland Cements Direct Importers of German Portlands.

Leading Shippers Throughout the Northwest, of Mason's Building Materials in General.

Tell 'em you saw it in ROCK PRODUCTS

OWL CEMENT

is not the only Portland Cement,
but one of the best manufactured.
Pamphlet sent on application.

GERMAN-AMERICAN PORTLAND CEMENT WORKS,

E. L. COX, General Sales Agent,
1511 Marquette Building, Chicago, Illinois.

Members Illinois Lumber Dealers Association.

WE SELL TO DEALERS ONLY.

Special Cement Working Machinery

Combination Power Presses for the manufacture of cement tiles, floor tiles, sidewalk blocks, veneering stones and pressed brick.

Hand Presses for New Era cement roofing tiles, ridge rolls and cement shingles.

Stair Steps Molds, the most perfect made.

Curbstone Molds of the most improved style.

Color Mixers for colored cement work.

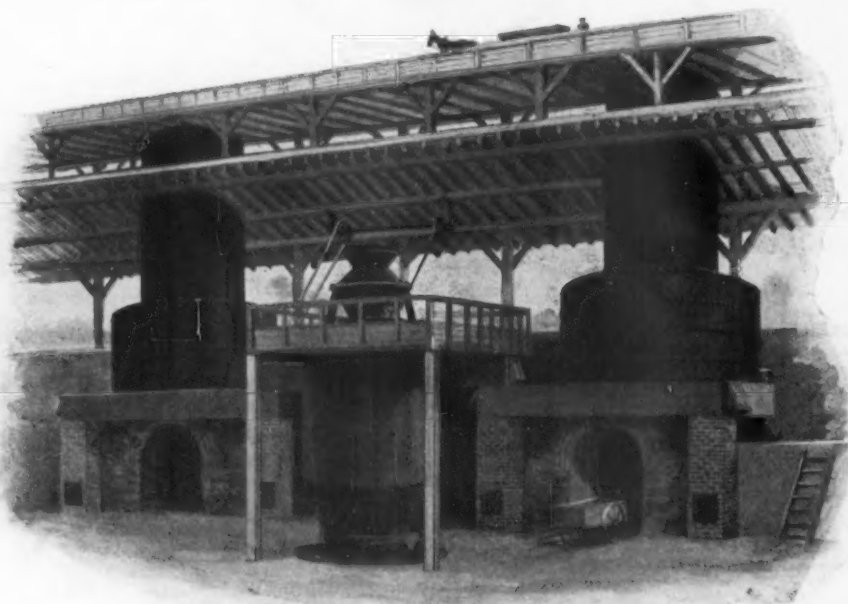
FURMAN CONSTRUCTION COMPANY

971-979 Bellevue Ave., DETROIT, MICH.

Sole Representatives for the United States and Canada.

Gas Producer Plant of the New England Lime Co., New Milford, Connecticut.

PRODUCER GAS
Makes the Best Lime
It increases the
Capacity of a Plant
and Reduces the
Fuel Bill



The Total Cost of
This Installation
Will be Paid for by
the Saving Effectuated
During the First
Year of Operation

We are now equipping a second plant for above company at Canaan, Ct.

MORGAN CONSTRUCTION CO., 40 Exchange Place, New York, N. Y.

Works at Worcester, Mass.

"CREAM OF LIME"

Produces the Smoothest,
Hardest and Best Finish.

The **BUCKEYE LIME CO.**

**GENOA,
OHIO.**

Tell 'em you saw it in ROCK PRODUCTS.

OUR HIGH GRADE PRODUCTS



Largest Capacity of Hydrated Lime in the United States.



WOODVILLE WHITE LIME CO., WOODVILLE, OHIO.

WESTERN LIME CO.

HUNTINGTON, INDIANA
MANUFACTURERS OF

LUMP LIME

ALSO, DIAMOND BRAND SUPERIOR WHITE FINISH

A HYDRATED LIME

AND A GROUND AND FERTILIZER LIME

Capacity 4,000 barrels or 10,000 bushels per day. Capacity of Hydrated Lime, 120 tons per day. Our LUMP LIME as well as our HYDRATED LIME is the very best obtainable for all purposes for which a good lime is needed in erecting buildings. Our HYDRATED LIME is absolutely the best finishing lime on the market.

Farnam "Cheshire" Lime Co.

OF CHESHIRE, MASS.
MANUFACTURERS OF THE

Celebrated "Cheshire" Finishing Lime.

Well known throughout New York and the Eastern States as the finest finishing lime manufactured. The special feature of this lime is its quick and even slacking, thus preventing any cracking or checking when put on the wall. It is the best lime used in the country today for all

HIGH GRADE FINISHING WORK

Selling Department, 39 Cortlandt St., N. Y., C. J. CURTIN, Pres't.

The Strongest White Lime

ON THE MARKET

Uniform Quality

Finest Grain

BEST FOR SAND-LIME BRICK and Chemical Purposes

Our building lime has no superior, carries more sand, makes more mortar. Crushed stone for all purposes; Stone dust, and Carbonate of lime. Best facilities for prompt shipments. CORRESPONDENCE SOLICITED.

MITCHELL LIME COMPANY

MITCHELL, INDIANA

Tell 'em you saw it in ROCK PRODUCTS.



**Big
B**



Lime.



BIG B LIME

ITS HISTORY IS A STORY OF SUCCESS.

The Building Trades' Barometer. The Iron and Steel industry promises increased activity. It is predicted that a new tonnage record in that business will be established.

This means a large demand for LIME, and transportation facilities taxed. Isn't it wise to arrange early for your supply of LIME?

BIG B's quality is unsurpassed. That means satisfied and contented contractors for you. Our quick shipping facilities mean fresh lime on short notice.

A POSTAL CARD WILL BRING OUR 1905 MEMORANDUM BOOK.

THE NORRIS AND CHRISTIAN STONE AND LIME CO.
MARION, OHIO.

R. ACHERMAN, Pres.

L. V. UNCAPHER, Sec.

J. W. THEW, Treas.

The
Central Ohio Lime and Stone Co.
of Marion, Ohio.

CAPITAL \$150,000.00.

We own One Hundred and Seventy Acres of the best and choicest lime and stone land in Central Ohio. The plant is located north of the city on the Pennsylvania R. R. We are now operating our plant with a large force of the most experienced men that can be found anywhere.

We produce and have the statements to show that we have the best white lime that is on the market. Our furnace stone is pronounced by experts and consumers to be the best they have ever used.

Our kilns and crusher plant are now in full operation and we solicit your patronage. We guarantee our product to be as good as the best, give us a trial order and be convinced of our statement. All orders placed with us will receive prompt attention.

The Central Ohio Lime and Stone Co.

ROCHESTER LIME CO.

209 Main St., West, Rochester, N. Y.

MASONS' SUPPLY DEPOT.

Manufacturers of, and Wholesale Dealers in

Snow Flake Lime, Cement Building Blocks, Alpha Portland Cement, Hoffman Rosendale Cement, Cummings Akron Cement, Kings Windsor Wall Plaster, Kings Plaster Paris, Fire Brick, Fire Clay, Dynamite, Caps, Exploders, etc.

FOWLER & PAY,

Brown Hydraulic Lime, Austin Hydraulic Cement, Jasper Wall Plaster, Brick, Stone.

CEMENT WORKS: Austin, Minn.
PLASTER MILL: Ft. Dodge, Iowa.
WAREHOUSE: Minnesota Transfer.

MANKATO, MINN.

Tell 'em you saw it in ROCK PRODUCTS.

Swindell Patent Cement Burner

Six kilns in operation at Diamond Portland Cement Co.

Swindell Patent Lime Burner

Nine kilns in operation at Toledo White Lime Co.

The Only Successful Methods of burning Portland Cement and Lime by Producer Gas. Economical.—Increased Output.—Saving in Fuel.

Wm. Swindell & Bros., German National Bank Bldg.,
PITTSBURG, PENNSYLVANIA.



**ASH GROVE
WHITE LIME ASSOCIATION**
MANUFACTURERS OF
**High Grade
White Lime.**
KANSAS CITY, MISSOURI.

PURE CARBONATE OF LIME FOR ASPHALTING.

We also manufacture Eichel's Blue River Lime.

We have low freight rates to all points. Can make prompt shipments. Ground to any fineness. Let us send you sample. Quarries, Milltown, Indiana, on Southern Railway.

EICHEL LIME & STONE COMPANY,
General Office, Eichel Block, EVANSVILLE, IND.

ANALYSIS OF OOLITE STONE

found in quarries of Eichel Lime & Stone Co., as made by Mr. W. S. Blatchley, Indiana State Geologist.

Calcium Carbonate.....	98.91
Iron Oxide and Aluminum.....	.15
Magnesia Carbonate.....	.63
Insoluble Hydrochloric Acid.....	.48

100.17

The Ohio Lime Company,

MANUFACTURERS OF AND WHOLESALE DEALERS IN

WORKS AT

Fostoria, Ohio.
Gibsonburg, Ohio.
Sugar Ridge, Ohio.
Tiffin, Ohio.

Ohio White Finishing Lime,
Ground Lime, Lump Lime,
Fertilizer, Hydrate Lime,
Cement, Plaster,
Hair, &c.

Capacity
3500 Barrels
Per Day.

OFFICE:

709-210-211 CHAMBER OF COMMERCE BUILDING.

TOLEDO, OHIO.



Get right, use
"Leviathan"

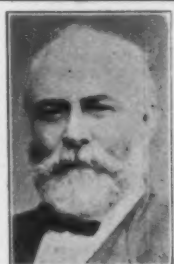
ONE SAYS:

The reason why we use "LEVIATHAN" Belting in preference to all others is that we find it in efficiency and durability at least 50 per cent. in excess of the best special faced rubber belting obtainable.

(Signed) LAKE COUNTY GRAVEL CO.
By W. T. EATON, Treas.

MAIN BELTING COMPANY, Manufacturers.
55-57 Market Street, CHICAGO, ILL.

PHILADELPHIA, 1219 Carpenter St. BOSTON, 120 Pearl St. BUFFALO, 40 Pearl St.



MAURICE GANDY,
Inventor.

The Genuine Gandy
Stitched Cotton Duck Belting

is adaptable to all sorts of conditions, and all kinds of outdoor and indoor work. There in a nutshell is the reason why it is superior to leather or rubber belting. Another reason is that it costs less and lasts longer.

Trying conditions only prove the superior qualities of Gandy Belting the more conclusively, whether you use them as conveyors or as transmitters of power.

We are now stamping our Belting "Genuine Gandy Belt" instead of "Original Gandy Belt," every ten feet. But either stamp assures you of getting the real and only Gandy Belt.

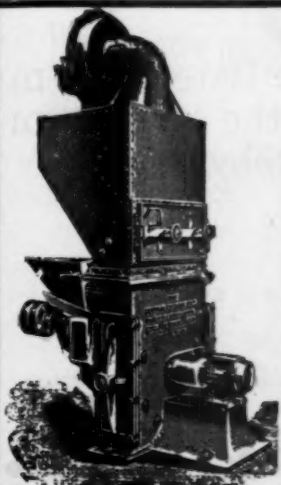


U. S. Pat. Office.

The Sign of the
Best Belt.

The Gandy Belting Co., BALTIMORE,
MARYLAND.

Cyclone
PULVERIZER.



STRAKER'S PATENT.

AIR SEPARATION—The product can be made of any desired fineness without sieving.

DUSTLESS in operation.

OUTPUT per H. P. per hour of the Cyclone Mills is much larger than that of any other mills.

We build SCREEN SEPARATION MILLS too.

CATALOGUE on request.

WRITE US WITH SAMPLES AND PARTICULARS.

E. H. STROUD & CO.

Manufacturers for U. S., Canada & Mexico.

30-36 La Salle Street, CHICAGO, U. S. A.

DRYERS

TO DRY

Any Material

Built to meet requirements in
the most Economical Manner.

—BY—

J. R. ALSING CO.

Liberty St., NEW YORK

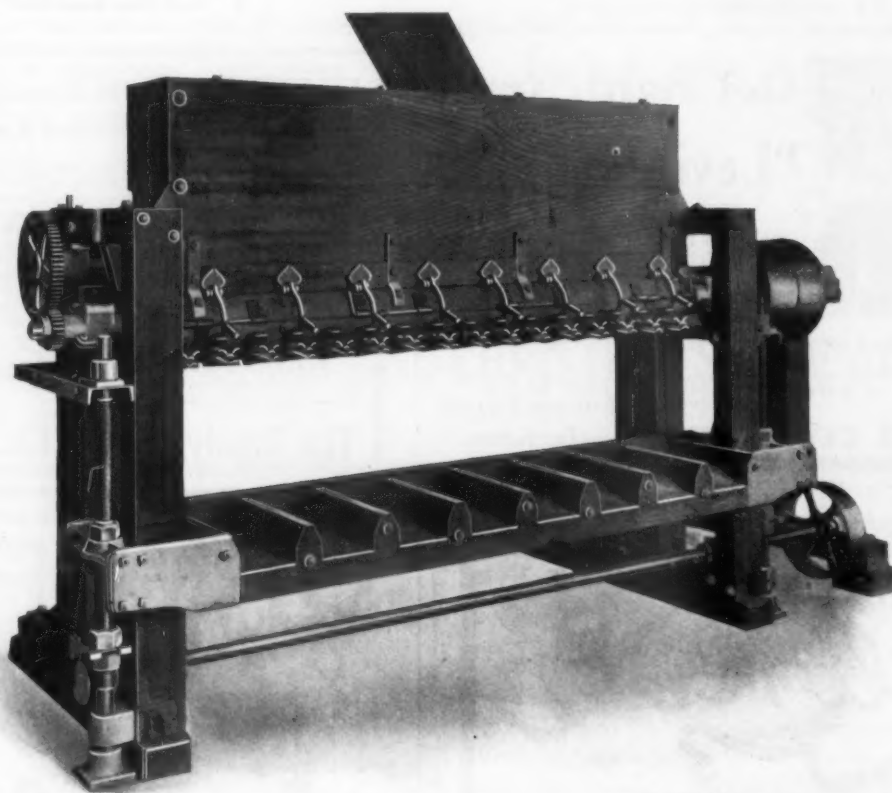
Tell 'em you saw it in ROCK PRODUCTS.

THE BATES VALVE BAG


Reduces the cost of handling Hydrated Lime.

Automatically Fills and Closes the Package

With a Minimum of Labor and Expense.



BATES SYSTEM BAG FILLING MACHINE, AS APPLIED TO HYDRATED LIME.

 The net economy to the manufacturer by using the Bates system for filling bags can no longer be disregarded, for the large item of packing expense is changed to actual profit thereby.

Paper Bags are filled with material without displacing
air at atmospheric pressure.

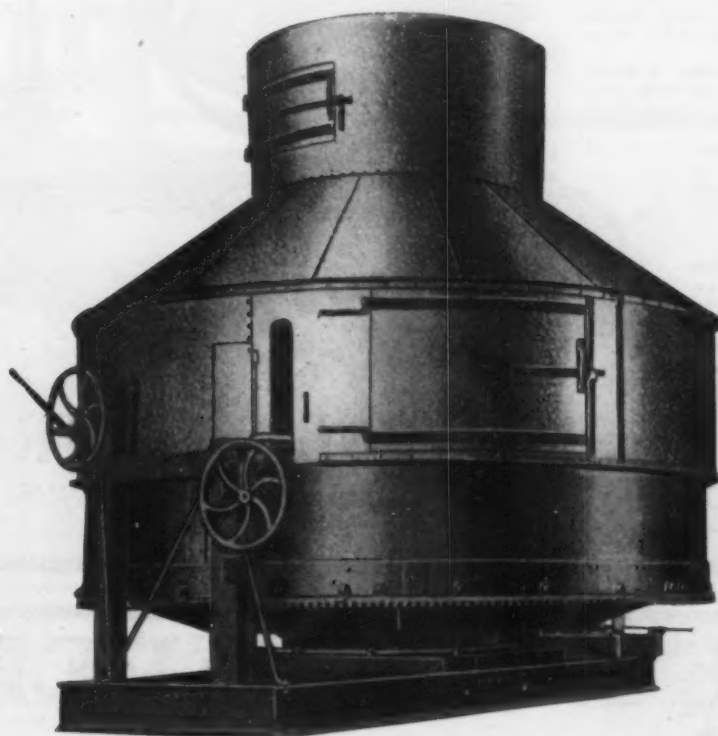
Attractive Proposition Now Ready For Your Investigation.

Urschel-Bates Valve Bag Co.

WOODVILLE, OHIO.

Tell 'em you saw it in ROCK PRODUCTS.

Hydrated Lime



It's
no
longer
a
question



But that there is a large and growing demand for hydrated high Calcium (or fat) lime. The coming season is bound to be a prosperous one, and the demand for this material will be a hundred times greater than the supply.

The above cut shows hydrating machine with galvanized iron hood as arranged for high Calcium or high Carbonate lime. No one disputes the fact of our success in Hydrating Magnesium or Dolomitic Limes, but we have been equally successful in hydrating high Calcium lime by our process and machinery. We do not change the physical characteristics one iota, if it is a good working lime when slaked from the lump we guarantee to hydrate it and not change its working qualities or make it work "short," but improve its quality by eliminating all clinkers, cinders and unburned cores.

You take no chances. We have long since passed the experimental stage, and are in position to guarantee positive results. WRITE FOR BOOKLET AND SAMPLE.

CLYDE IRON WORKS,
DULUTH, MINN.

Tell 'em you saw it in ROCK PRODUCTS.

Chicago Improved Cube Concrete Mixer

"IT HAS NO INSIDES"

This means a saving of \$2.00 per day. \$50.00 per month.
This on cleaning only. A self-cleansing mixer is a joy.

In a cube the sand, stone and cement are introduced in any order. No preliminary mixing is necessary.

They come out as perfect concrete.

With spirals in a trough mixer the material is fed along and comes out as it goes in. The spiral feeds and the water is supposed to do the mixing.

With deflectors the aggregates are simply divided and thrown around. The water is depended on to distribute the cement.

The cube has no deflectors or spirals. It draws the materials out at the sides, doubles them over on top and shakes them 90 times per minute from side to side.

It makes perfect concrete in 15 revolutions. No other mixer can do as well in double the time. Quality considered you save 10 cents per yard with the cube mixer, which amounts to many dollars each season.

You never have to pound it. The concrete does not stick. You have no insides to clean.

Send for catalogue No. 16.
Many sizes.

MANUFACTURED BY

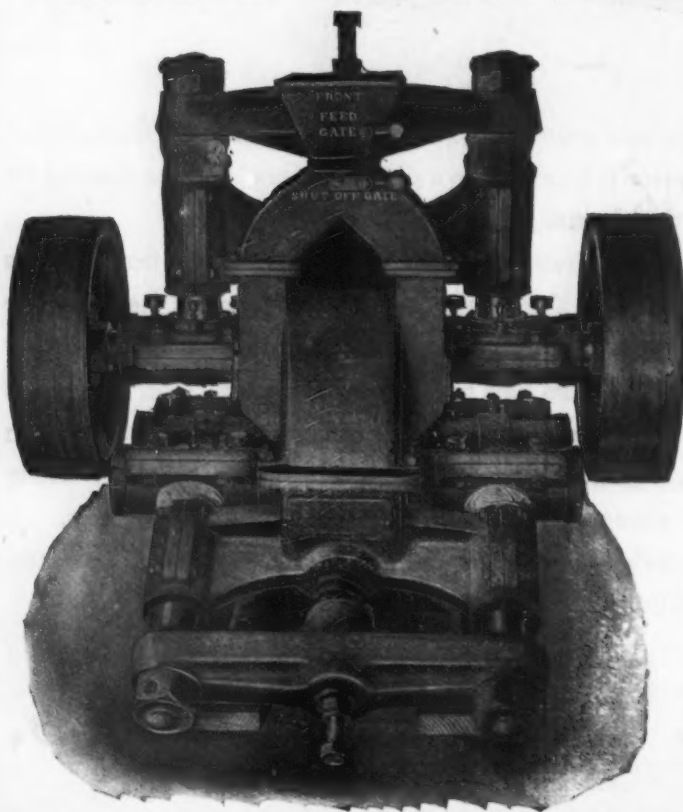
MUNICIPAL ENGINEERING & CONTRACTING CO.

600 Railway Exchange, Chicago, U. S. A.

We deem it a personal favor when inquirers mention paper in which our advertisement was seen.



THE KENT PULVERIZER



Takes one inch feed. Grinds to any fineness
from 10 to 200 mesh.

GRINDS PER HOUR WITH LESS THAN 25 H. P.

CEMENT CLINKER,	40 bbls.	to 98%	20 Mesh.
CEMENT CLINKER,	12 "	" "	100 "
LIMESTONE,	2½ tons	" "	200 "
LIME,	4 "	" "	100 "
ROSENDALE CEMENT,	43 bbls.	" 90%	50 "
QUARTZ TRAP-ROCK,	4 tons	" "	40 "

You can easily figure from this what a Kent Mill would save for you.

W. J. BELL, Esq. Supt.
NEWAYGO PORTLAND CEMENT CO.,
Newaygo, Mich.

Says:—Four KENT MILLS are driven by one 75 H. P. motor.

For Catalogs and Information, Address

KENT MILL CO.

170 Broadway,

NEW YORK.

Tell 'em you saw it in ROCK PRODUCTS.

Give Us Time

and we'll reverse the nebular hypothesis, by pulverizing the earth and the fullness thereof, whatever that means, to an impalpable star-dust. There's nothing that the Raymond Impact Mills won't pulverize from cornstalks and quartz to hallucinations and great mechanical "discoveries."

Raymond Mills

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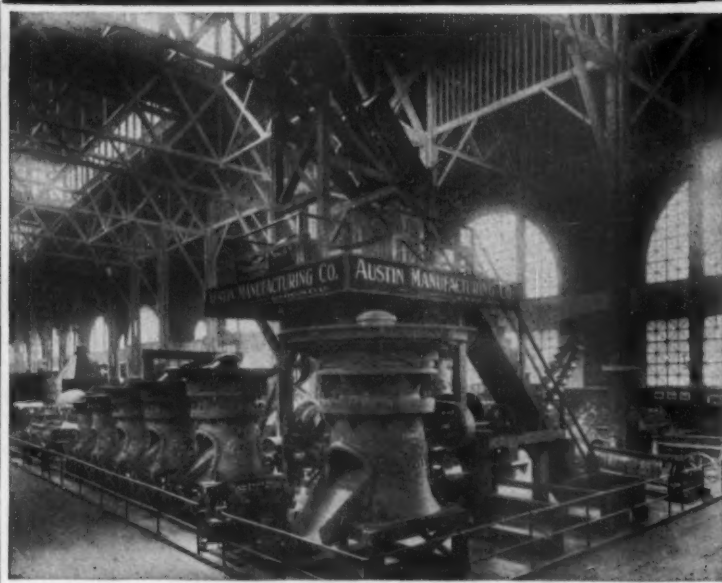
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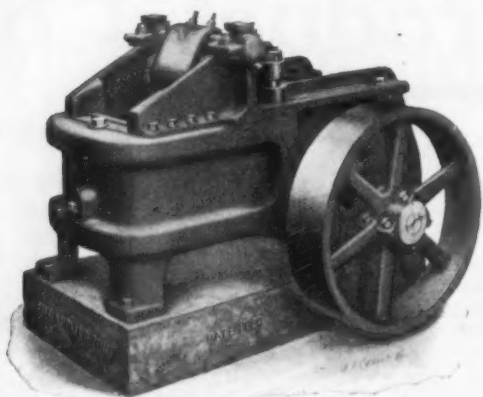
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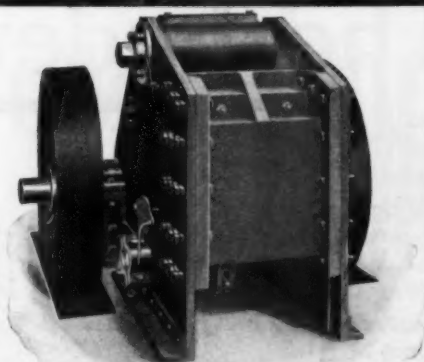


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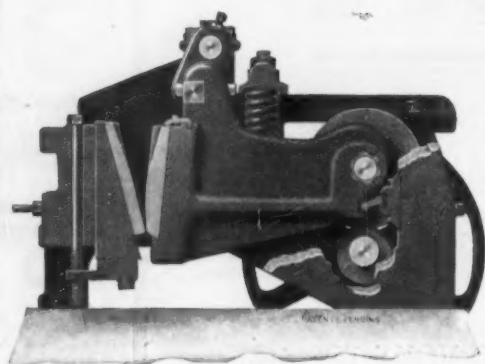
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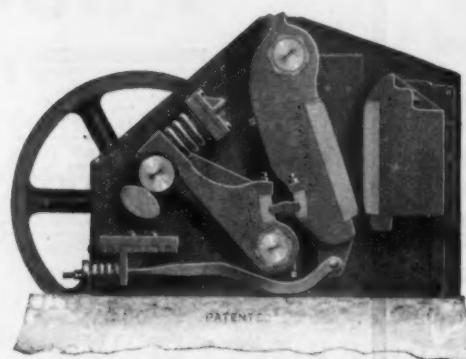
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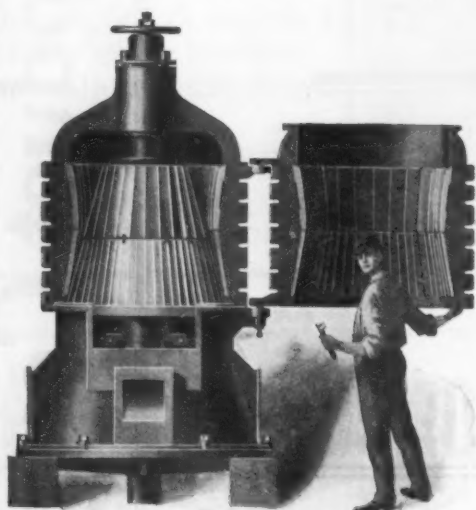
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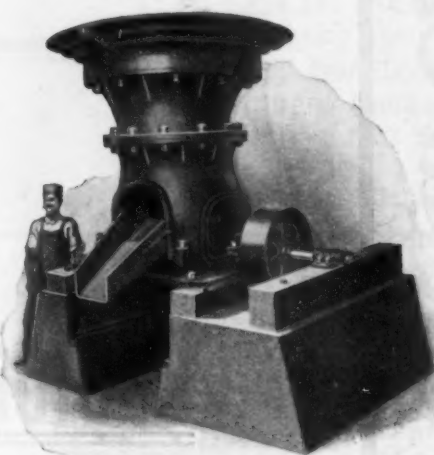
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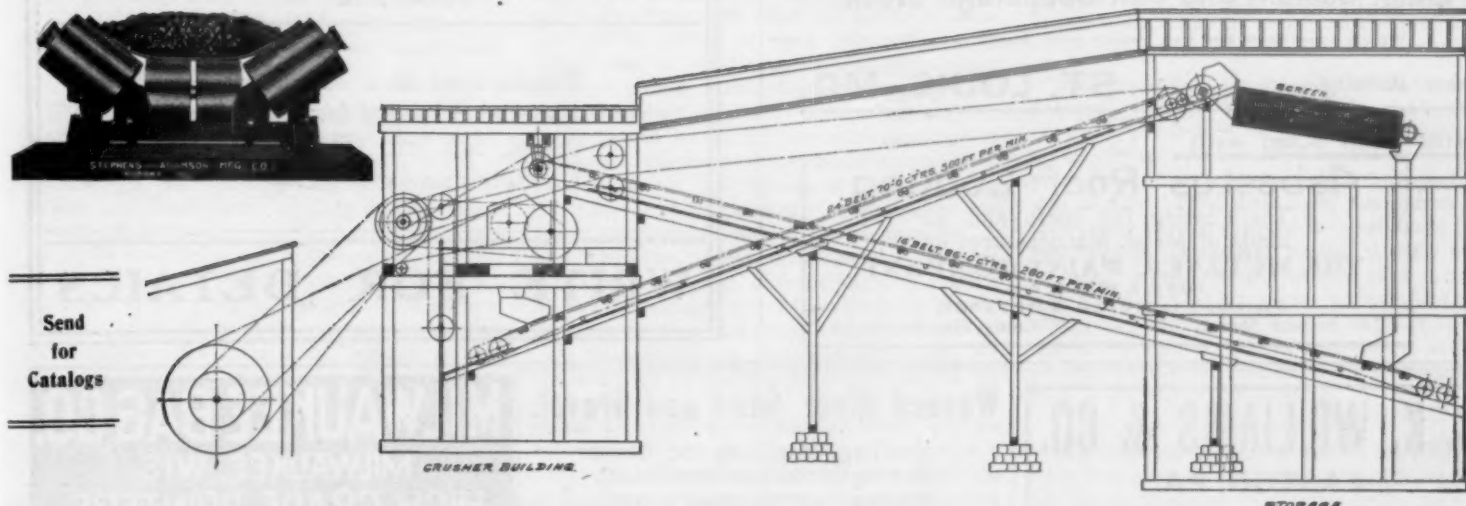
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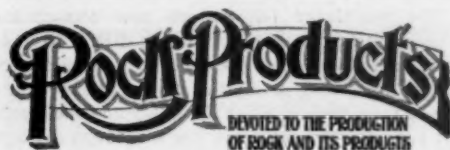
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SEMI-MONTHLY.

Entered as second-class matter December 16, 1905, at the Post Office at Louisville, Ky., under Act of Congress of March 3, 1879.

THE FRANCIS PUBLISHING COMPANY,
Publishers.

E. H. DEFEBAGH President.

A semi-monthly trade journal devoted to the interests of the manufacturers and dealers in rock products and kindred lines, including Lime, Cement, Salt, Sand, Slate, Granite, Marble, Sandstone, Grindstones, Artificial Stone, Emery Stone, Quarries, Monuments, Manganeses, Asphalt, Phosphates, Plaster, Terra Cotta, Roofing and Roofing Tile, Coal, Oil, Mineral Wool, Brick, etc.

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Regular Staff Correspondents in the Principal Centers.

The mission of ROCK PRODUCTS is to serve the trade in any and every honorable way possible, to promote better profits and make life more pleasant for those engaged in the business to which it caters. With this end in view, criticism is courted, and all are invited to use its columns to further ideas and suggestions for the good of the trade. The office, too, is at the service of the constituents of this paper; so when you want to buy or sell, or merely ask a question, write, and when you are in town, call and make it your headquarters.

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LOUISVILLE, KY., JAN. 22, 1906.

The Annual Concrete Conventions.

THE two great concrete conventions of the year have been held, The National Cement Users' at Milwaukee, and the Northwestern Cement users' at Minneapolis, the Minneapolis convention following almost immediately after the close of the National Meeting at Milwaukee. Having attended with care all of the exercises of both of these occasions, there is but one competent comment to make, and it was apparent to every one of the large attendance at either of both of the meetings, namely, the concrete industry has made a very marked advance over the situation as presented at the Indianapolis and Minneapolis conventions held about one year ago.

The factor of uncertainty which prevailed at that time made the entire industry bear the aspect more or less of an experiment. This has entirely disappeared, and it can be truthfully affirmed that concrete building material, as manufactured at the present time, is a well accepted and well respected industry of the first order, and one destined to revolutionize all the old ideas of construction within a very few years.

The exhibit features of both of these conventions were very liberally patronized by the manufacturers of machinery designed for the producing of concrete building material of every variety. Quite a number of the leading lines of machinery that were represented in the exhibits one year ago were again represented, in every case with improvements and additions to the completeness of the line.

More attention has been devoted to the matter of mixers, and a large number of carefully designed contrivances to take care of the most important feature of the business were exhibited, and many of the discussions at both the conventions were given to the preparation of materials by those men, who have found in practice, that the mixing of the mass of the most important stage of the process.

cess of manufacturing concrete materials of any Those machinery builders who have devoted their energies to producing moulding apparatuses for capitals, pedestals, ornamental columns, pilasters, and the ornamental adjuncts to the building industry, exhibited wonderful progress, and it may be said that among the exhibits could be selected a machine for taking care of every requirement that the most exacting architect might put into his drawings, at once, eliminating one of the principle objections to the new method of construction in the past.

One year ago, there was but one concern offering a machine for the manufacture of sand and cement brick. At the present conventions, the brick machines constituted one of the great features. There was no less than ten different ideas expressed in the several machines offered for the manufacture of sand and cement brick, and there was not one of them without considerable merit. In fact, the sand and cement brick, was demanded before the machine was made to take care of it, and not a few of the members who attended the meeting became purchasers of some of these machines.

Indeed, there was no part of the exhibiting space at either of the two great conventions that was not visited and carefully inspected by every attendant of the convention.

At Milwaukee, two large buildings were entirely filled with exhibits, besides the ponderous mixers that were doing business in the street, and the weather man seemed to shuffle his best days to the front for the cement users' convention.

All the sessions of the convention were faithfully attended by the members and a higher class of papers were offered than upon the former occasion, and the discussions of them indicated a much higher order of intelligence, for most of the speakers were talking from actual experience and not from guess-work.

The hall in which the convention was held at Milwaukee was most unfortunately unadapted to the purpose, but this was one of those difficulties which had to be surmounted by accepting the best which was possible under the circumstances. It was impossible, however, for some of the exhibitors to get a fair deal, although the local committee and the management of the association went to the limit of their endeavors to accommodate all.

At Minneapolis, the conditions were much better, as the exhibit features were provided with better space and better light to display their machines, while the convention hall, itself, was not interrupted by or interfered with by exhibition.

From an educational standpoint, very much has been accomplished by these two great conventions, and it shall be our pleasure as space permits in the near future to print for our readers all of the best papers that were presented at these conventions. The position that Rock Products has taken in the concrete industry is well known to our readers—more light, more progress, more development, until the highest possible results are obtained to the concrete industry, and this was the purpose and the ultimate results of the conventions at Milwaukee and Minneapolis.

Those who attended have been benefited at first hand, and for the sake of those who found it impossible to attend, Rock Products means to give the full benefit of our organized force for the promotion of the industry and every several members interested in it.

On To Philadelphia.

EVERY builders' supply dealer in the United States who considers himself progressive will attend the convention of the National Builders' Supply Association at the Bellevue-Stratford Hotel on February 6, 7 and 8, and every American business man in these days of prosperity should get a move on and be a progressive member in his line of trade.

Every concern that handles builders' supplies is invited to attend the convention and join the association. Much is to be learned in the way of new methods, and of new materials that are constantly coming into the market. If you have been making money in handling builders' supplies, you want to get yourself in line to make more money in the coming year. This is strictly a dealers' association and the results that it has accomplished for its members are best attested by the enthusiasm of the old guard who came in seven years ago.

The attendance at Philadelphia will undoubtedly be the largest in the history of the association, and it is up to the supply dealer in every locality who wants to take the lead to either attend in person or to be represented upon this important occasion. The information to be gained with regard to new building materials at this convention will more than repay the expense of attendance from the most remote sections of the United States. Rock Products hopes to see the whole army of our friends and readers in the builders' supply line turn out in force under the banner of "Progress."

Fine Meeting at Chicago.

THE National Lime Manufacturers' Association met in annual convention at the Great Northern Hotel January 18 and 19. This convention was well attended and the enthusiasm and interest of the lime manufacturers in their association was renewed. A great deal of good educational matter was presented and discussed. Indeed, the educational features developed were very important and practical to the manufacturer of lime. An extended report of this meeting appears in another part of this paper, under its proper department.

THE popularity of the expanded metal system of fireproof construction in the cities of Pittsburg, Cleveland and Buffalo is something more than unusual. There have been constructed or are now being constructed, a large number of school buildings in these three cities upon this system. In these cases concrete expanded metal floors have been adopted throughout. Besides in many more, expanded metal lathing has been used in cases where the frame work of the building has been wood. In bringing this about it has been demonstrated that not only the system is perfect as a fire proofing scheme, but it has accomplished great economy in the cost of the building.

THE American Society for Testing Materials has decided to consider the establishing of a standard fire test for fire proof floors. The committee wishes to collect all available data of fire tests, and information resulting from the study of fires and conflagrations, more particularly as to the temperatures reached and the duration of same. Prof. Ira H. Woolson, of Columbia University, of New York, is chairman of the committee having this matter in charge, and the secretary is R. P. Miller, 141 East 40th Street, New York City. Information containing records as complete as possible will be greatly appreciated, if contributed by those who possess such data. It is proposed to analyze and study all the information received, and then to publish the same with the hope of drawing forth suggestions and criticisms from all who may be interested.

High Calcium for Concrete.

ONE of the points prominently brought out at the recent concrete convention was the importance of adding a small percentage of hydrated lime to the concrete mass for the purpose of obtaining a higher water-proof quality to the building block or cement brick. In almost every case the parties referring to the matter have merely said "hydrated lime," when they should have said "high calcium hydrated lime." It is absolutely necessary that this point be understood. When hydrated lime is added to a concrete mixture, it should always be calcium oxide as near 100 per cent pure as possible to be obtained.

A dolomite lime containing from 25 to 40 per cent of magnesia can not be allowed in any concrete mixture, for it will contaminate the Portland cement and entirely destroy its usefulness. This explains the failure that some parties have had with their experiments in using lime in their concrete mixture. We were careful to interview every party who had a complaint of this nature at the Milwaukee convention, and in every case, it was found that a dolomite lime had been used and we have reason to know that those who have made such a great success have employed a high calcium lime.

Rock Products was the first to suggest and recommend this great improvement in the concrete mixture, and we are glad to note that in every case where it has been intelligently practiced it has produced very gratifying and profitable results. This is particularly true where the hydrated lime has been used in the dry or semi-wet mix, obtaining much greater energy from the same amount of cement.

Developing the Concrete Mixer.

Some of the best mechanical engineers in the country are directing their efforts towards the development of the concrete mixer. There is no little diversity of opinion as to just what a concrete mixer should be. Each inventor considers that his machine will cover the whole range of the requirements of the industry, but frequently we hear of a concrete contractor being very much disappointed in the way his mixer works. Now, viewing the business as a whole, taking into consideration all the various avenues of progress that have been opened in concrete lines, not only within the present year, but within the last few years, it appears to us that no one mixer will ever succeed in being sole master of the situation. Several very satisfactory mixers have come on the market and have proven themselves efficient for the wet mix contractor, and these for the most part have been employed in the construction of all the reinforced structures that have been erected up to the present time, and they have been employed by the cement post makers, which is, strictly speaking, a wet mix proposition also.

The dry mix requires another kind of a mechanical mixer. The materials that enter into the dry mix are, properly speaking, intimately mixed in their dry state, and the slight amount of water used must be uniformly sprayed into the mass for the regularity of the proportions at once become more important as the finer results of texture for finished surfaces is taken into consideration. If all the materials that entered into the concrete mixture were thoroughly dried, screened and prepared in such a manner that it reaches the mixer either by means of a conveying or feeding device, or even if merely shoveled in, the matter would be simplified to a great extent. The trouble with mixers in nearly every case is directly traceable to the condition of the materials when placed in the machine.

After interviewing twenty-five concrete contractors and asking them all practically the same

series of questions, we find that we have twenty-five distinct ideas as to just how the materials should be handled before they are placed in the concrete mixer. One man who has had no little success in his undertakings, attaches no great importance to the mixture of his materials. He said, "I use any good Portland cement, and such sand as can be conveniently secured, according to the location of the job and crushed rock, including the screenings as it comes from the crusher, and these are mixed in the general proportions of 1, 2 and 3, one of cement, two of sand and three of the crushed rock." Now, standing alongside of this man's operations you will see his workmen shovel a wheelbarrow load of crushed rock off the ground containing small pieces of brickbats, clinders, macadam rock, screenings; in fact, not the slightest care was taken in shoveling up the material. The sand also has been dumped on the ground and this is shoveled up in the same manner and loaded into his batch mixer. Another man comes along with a sack of cement on his shoulder, pours it in with the other materials, closes the lid and turns on the power. The water is supplied by means of a faucet and it is allowed to run "about long enough," then the faucet is turned off and the mud is emptied out into the wheel barrows and deposited in the forms. Now, there is no way in the world for that man to tell with any degree of certainty, of just what his concrete mixture consists, and although he has never had any trouble with any of the work he has put up, we can not help but feel that some day such proceedings are going to bring him right up face to face with a failure.

The idea of a continuous mixer for the wet mix has never reached any high degree of popularity for the reason that it has been found almost impossible to adjust the speed of delivery of the three ingredients which are desired to be obtained in a good mixture. The use of the mixer in wet mix concrete operations has come to be much better understood because it has been used to a greater extent than any device directed exclusively to the use of a dry mixture. In fact, everything pertaining to wet mix concrete is much better understood, at the present time, because it has received a great deal of attention from the best engineers in the country, and the tests have been conducted with so much elaboration and careful attention that we know from a scientific standpoint just what to expect from the wet-mix concrete mixture.

On the other hand the development of correct knowledge with regard to the dry-mix has been for the most part unsatisfactory and unscientific. Such parties as have devoted any attention to the testing of building material made with dry-mix concrete have only handled it in a superficial manner. We do not know of a single well studied and carefully conducted test of any concrete building material or operation that has been conducted and reported in such a way as to make it valuable as a guide to future operations. It looks to us as if the ideal dry-mix mixer could be either a batch mixer or a continuous one, but in either case the material should be prepared with such a degree of uniformity, at least, that the material to be produced from the mixture may have enough similarity so that one piece of finished product will look like another. One of the troubles which has caused no little complaint in the concrete block industry is the lack of uniformity of color, and this to a greater or lesser degree can be accounted for by the difference in the materials that originally entered into the composition. It is impossible to mix up a few shovelful of sand and a few more shovelful of screenings from the crusher with a guesswork proportion of cement and "just a little water," and have the composition of the finished blocks the same all day. In fact, it is a wonder that any two of the blocks look alike.

The machinery fellows are now announcing their mixers, and there is not one directed to the dry-mix industry, especially that does not contain a great deal of merit. In fact, there is not one of them that will not profitably do good work, but none of them will turn out a uniform dry-mix unless the materials are prepared in a uniform manner before they enter the mixer.

Improvements in Stucco.

ONE of the growing uses of gypsum plaster is the rapidly developing and increasingly popular modeling for interior finish. Exquisite classic designs have been perfected for columns, half columns, friezes, ceilings and surfaces of every description. The uncouthness that was apparent in such work only a few years ago has for the most part disappeared, and it is now easy to procure at small cost at all the principal markets perfect work of the most delicate texture and design. Indeed the sculptors who have gone into the stucco business have taken a step beyond all this, and by coating their work with a water-proof solution have made it very desirable for permanent outside decorations. The coloring effects that have been obtained by the most successful operators in this line give such excellent imitations of the various marbles, onyx and porphyry, besides bronze and other metals that it is exceedingly difficult to tell that it is really an imitation.

There is no doubt that the great international fairs have contributed in a great measure to the growth of this art, and the development of its practicability as a permanent building material. The vast quantities of stucco that was made for the World's Fair at Chicago, could not be compared with the enormous improvements that were shown in the same material at the St. Louis Fair. This growing industry is one of the few permanent benefits that have been derived from the enormous expenditure of our great international fairs, and from the aesthetic standpoint it would be well worth the cost alone, for it has placed real art within the reach of a thousand purses that were unable to consider it in richer materials.

THE sand-lime brick manufacturers are ahead of their brethren in the concrete line with reference to the proper preparation of the raw materials before they reach the stage of mixing for the manufacture of their product. It would be well for the concrete operators to take a lesson from the sand-lime brick men so as to grade and secure uniformity for each material that enters the mass. Each and every batch should be made exactly alike. Too much can not be said about the absolute control of the uniformity of materials. There are a great many things which by carelessness could find their way into the mixture that would be very deleterious even to the point of causing the failure of the finished work when least suspected. We must not overlook the fact that every kind of concrete work is a chemical operation, and finally governed by the chemical process of crystallization into one mass of several inert particles.

Don't fail to look over the advertisements in your trade paper. Sometimes you will find an attractive proposition in materials or machinery that will contribute to your profits by suggesting an improvement in your line or about your factory. Whenever a fellow drops back to the rear or falls out of the procession, upon investigating, it is found that he was one of the strikers who could not profit by a suggestion, and who thereby has failed to observe the onward march of progress. Read the advertisements in Rock Products, they are every one an up-to-date editorial offering profits by opportunity to the right man.

From Our Own
Correspondents.

GREATER NEW YORK.

New York, N. Y., January 22.—The past year was a very good one in the building trade and if the early part of the year had been uniformly as busy and peaceful as the latter part a phenomenal season would have been the result. As it was, almost every line contributing to the building trade showed large gains and a gratifying advance in prices, some things like lumber reaching remarkably high levels. Some of the increases as demonstrated by a comparison of notes at the Exchange are as follows: North River brick, 20 per cent; that is, an increase of 20 per cent over the sales of 1904. Rosendale cement, 20 per cent; plaster products, 10 per cent; lath, no increase, the amount being the same as 1904, about 350,000,000 of pieces.

It was somewhat more difficult to compute and verify the increase in Portland cement, but it was put down at 15 to 20 per cent. Lime showed an average gain of 40 per cent. As to laths, the stand-still is accounted for by the growing use of plaster boards, steel lathing and fire proofing. The lack of gain in plaster may be ascribed to the loss of about two months of the year when navigation from Nova Scotia and New Brunswick was suspended by the freeze-up bringing about a scarcity of plaster rock, and the same cause around have operated to bring about a scarcity of sand for making the hard mortar. Altogether it was a flourishing year, but still the trade looks for a better one for 1906.

Still Endeavoring to Make Trouble.

The new year opened favorably in the matter of weather. Not for many years has building been carried on so uninterruptedly so far into the next year. There is a general feeling of encouragement over all the conditions. The Associated Building Trades is now the only discordant element in the whole combination. They have been working hard to get the other unions to take up the house-smith's fight on the ground that the open shop was unjustly forced upon them. As for the Employers' Association they say they are through with the house-smiths, who, by their own unlawful acts, have lead themselves out of the arbitration and agreement, thereby making their business "open," and the "open shop" principle is the only one that will be hereafter recognized for that trade.

Cement Finished Up the Year Well.

The open winter has carried building operations along so far before the housing-in stage was reached that all building materials have had an unexampled run, and cement in particular has profited well by the favorable conditions. The demand, though now slackening, has been enormous and has continued so to the very last with a result that it has reached a mill price of \$1.65 in wood and \$1.70 in cotton, figuring 7½¢ for bags returned in good order. Every one connected with the trade is hopeful for a much better year, even than 1905.

Brick Yards Preparing for Big Demand.

Mr. W. K. Hammond, foot of W. Fifth Street, commented on the brick situation, saying: "The quantity now on hand at the yards compares well with the demand, although it is not quite as large as at this time twelve months ago. The price afloat is \$11.00, which may be said to be a normal price, as just now the demand is slight, but a strong price is looked for at the opening of the season. The number of barges that arrived from January 1, 1905, to January 1, 1906, was 3,589, and with 325,000 bricks to the barge, the immense number can be readily computed. This does not include some 50,000,000 more carried on sailing vessels."

As to the conditions in the yards, the low prices for many years had reduced the spirit of enterprise in the manufacturer to a condition which compelled him to produce only what would keep his plant in existence so that the supply was reduced by this means to several hundred millions yearly less than the capacity of their output.

Complications in the Clay Pits.

The land slide in Haverstraw will be the occasion of many more tangles than will result from the suits of sufferers against the corporation and the brickyards, and of the town against the brickyards. An immense quantity of fine clay has been variously dumped into other claims. As for instance, one brickmaker that has been working at a very deep level now finds his pit filled with clay to a high level, which clay, however, came from a neighboring claim. And here is where the confusion comes in. The owner of pit No. 2 wishes to get at his own clay buried under the slide from pit No. 1, but the owner of No. 1 claims the clay and forbids the owner of No. 2 to touch it. Owner No. 1 has another bank further along from which he gets his supply and is in no hurry to touch or remove his property from the land of No. 1, and so the latter is absolutely put out of business. Peculiar local laws governing these clay beds have grown up with the working of them, ordinary laws of property not exactly fitting such cases, and some complicated "lawing" is very confidently looked for.

More Model Tenements.

About a year ago Henry Phipps appropriated \$1,000,000.00 for the purpose of erecting model tenements in New York. Two groups of such houses have already been built and the third is to be erected at the southwest corner of Ninth Avenue and Twentieth Street on a plot fronting 100 feet on the avenue and two hundred and fifty feet on the street. The property was owned, and until some little time ago was occupied by the Ingersoll-Sergeant Drill Co.

Will Handle Lime in Bulk.

Mr. Perry, of the Rockland-Rockport Lime Co., said December had been a very good month, even though not quite up to the banner record of November. The whole year had been very good, showing an increase of 45 per cent over 1904. The open weather was keeping up the trade, and orders were still being put in briskly. The general outlook for 1906 was good with every promise of being as satisfactory a year as 1905.

Mr. Perry further stated that his company was now getting ready to handle lime in bulk. They had six large barges, each carrying 1,600 tons of bulk lime. In their yard at Greenpoint, near Newtown Creek, they are erecting two steel tanks which will each hold 12,000 barrels of lime in bulk. These tanks are air and water tight. They are also erecting one of the latest style of steam diggers which will take the lime directly from the barges and deliver it to the tanks, thus avoiding all labor in handling the lime, which is a big and important item, especially in summer time. The company intends to make this yard their main station and will deliver by lighters and teams to all parts of Greater New York. They expect to increase their output one-third by this system.

Will Include the Government Report.

The Combustion Utilities Co., of 60 Wall Street, has issued a folder telling of their process for burning lime, and they give extracts from the government report of the Dominion of Canada, in which the Eldred Process receives prominent mention. The report takes up the main points of the process, touching on the principle of the system, on the long mellow flame, like the flame from a wood fire, also of the improved heating effect, and giving data as to the results obtained, to the effect that: "One lime burner reports a saving of \$50.00 per week per kiln by the use of the process, while an average output of 200 barrels per day of lime has been obtained from a single kiln burning dolomite rock." The report can be obtained by writing to the Department of the Interior, Mines Branch, Ottawa, Canada.

Re-Inforced Concrete Mill for Paper Making.

Mr. Ruggles, of the Curtin-Ruggles Co., 39 Cortlandt Street, is erecting a paper mill for the Traders' Paper Board Co., out near Hackensack, N. J. It will consist of three structures, the main one being 256x80 feet with two wings 153x96. The other buildings are 212x84 and 100x58. They will be of reinforced concrete throughout, with floors and roofs of the same. The second floor is to stand a working load of 400 pounds to the square foot and the third of 200. The system will be their own, but they will use the St. Louis corrugated bars and the Expanded Metal Co.'s product for part of it, the quality of the former material to be used being about 180 tons.

The company is now sending out a number of dryers; to the Campana Fundidora, of Monterey,

Mex.; the Niagara Cement Co., Buffalo; the Electric Reduction Co., Buckingham, Quebec; the Holland Sandstone Brick Co., Antioch, Cal.; the Cheesborough Manufacturing Co., Perth Amboy, N. J.; Calm Bros., Jersey City; U. S. Graphite Co., Uwchland, Pa.; Otis Sand-Lime Brick Co., South Amboy, N. J.; Dexter Portland Cement Co., Nazareth, Pa.; and the Hilderberg Cement Co., Howe's Cave, N. Y. All of these are the Ruggles-Coles Co.'s standard dryers.

Mr. C. M. Curtin left on the 16th to attend the convention at Chicago.

Mr. C. W. Warner was in town about the middle of the month.

Sand-Lime Brick Machinery Company.

On January 3, 1906, The International Sand-Lime Brick and Machinery Co., was incorporated at Albany with a capital of \$100,000.00. The directors are: J. F. Cloonan, J. A. Byrne and Arthur McCausland, of New York. The purpose of the company is to install sand-lime brick plants and sell the machinery. It is said that the organizer and largest stockholder of this company is Mr. Louis F. Kuriatowski, recently connected with the late H. Huennekes Co. as president.

Looking for a Good Export Trade.

Mr. Abbe, of the J. R. Alsing Co., 136 Liberty Street, states that their business with the sand-lime brick trade is growing very rapidly. They have studied all the requirements of this trade and have made special designs to meet them, and as a result they have many advance orders on their books for this class of machinery. Also that they have been notified to prepare for a very large export trade which will be transacted through the International Sand-Lime Brick Machinery Co., who have secured the right for the use of such machines as the Alsing Co. manufacture for the sand-lime brick business. Mr. Abbe says that the J. R. Alsing Co., being the oldest concern in the country in their line of machinery, are best equipped in every way to produce the special type of machines needed for the new and growing business of sand-lime bricks.

On the Monotonous Rock Face.

Mr. Noyes F. Palmer said, referring to a statement in the December issue, regarding the over-preponderance of rock face patterns in hollow blocks, "Look at our catalogue of 1902 which gives a picture of fifty block patterns used as early as 1902, among which are but two of rock face. As a matter of fact the first concrete block construction in Philadelphia in 1903 did not have a rock face, but the corners were a rock panel with one inch axed margin, the first of its kind. The entire body wall of this Philadelphia building was a design similar to the Brooklyn bridge construction, i. e., picked face, with a one inch tool margin all around. Buildings were erected on Long Island with raised panel, and our first pictures of patterns show brick designs. It is now more than four years ago since we had iron patterns and made the product for tool and sawed effect in concrete blocks.

"Critics on this point had better look over our catalogue of 1902, and then come to our shop and see the iron patterns, and then view the buildings made from them, which show an effect far from the monotony of rock face.

"Recent buildings around New York City have brought out the crushed face, and our machine methods have been favorable to this. We have noticed in several technical magazines somewhat laudatory articles on a recent brush effect on a bridge entrance in Philadelphia. But this was done a year ago in a colonial mansion under the architectural skill of Hastings & Carrre of New York City. All of which only brings out the fact that newspaper and magazine prize writers have only a small vision of what has been accomplished to make concrete blocks look what they are, i. e., 'stone,' and not artificial rocks."

They Make a Stone Brick.

Professor Bliss, of the Avram-Leet Engineering Co., said of the Rochester plant recently completed by them that the contractors who built it spoke of it as the furthest plant northward in the county and that delays by freezing might be expected. But though the weather has been intensely cold there, no freezing has occurred, which, he says, speaks well for their dry process system. They publish a pamphlet which calls attention to the extreme hardness of their product, so much so that though bricks 24 hours old will stand a crushing strain of 3,500 pounds to the square inch it will run up to 8,000 pounds when they are a year old.

This method of using cement in the bricks makes them serviceable for hydraulic use under water, and for moulded face bricks and tiles. The folder calls attention to their special hydrator which hydrates all the lime and not 95 per cent of it. Their bricks are so hard and so strong that they call them stone bricks instead of sand-lime bricks.

Will Weigh One Pound Against a Thousand.

A visit to the office of the Richardson Scale Co., 11 Park Row, found them very busy, and it was learned that not only in their new plant at Passaic, N. J., fully employed, but they are making further extensions. They have orders in hand for several varieties of their machines, prominent among them being machines for weighing the correct proportions of sand and lime in the sand-lime brick industry; several scales for cement plants, more especially for weighing the cement into bags and mixing the right proportion of stone and shale, and they have also an interesting machine which will weigh about one pound of coloring matter against one thousand pounds of mixed matter used in the manufacture of bricks.

The Kent Mill Co., 170 Broadway, report the sale of two mills through the Stallman & Fulton Co., for Japan for phosphate grinding. This is a second order. The Mandeville mills, Carrollton, Ga., have ordered a Kent mill for phosphate grinding. They have also sent out a second mill to the Barker Chemical Co., Dunnellon, Fla. To the Consolidated Rosendale Cement Co., they have also sent a second order of two Kent mills for cement grinding.

Fire Could Not Hurt It.

From Mr. D. P. Carritte, of the U. S. Drying Engineering Co., 66 Beaver Street, it was learned that the Alpha Process Co., of Baltimore, to which they had just sent one of their improved dryers, was burned down and everything destroyed, but their dryer, around which the company will at once build another factory. They have just shipped a large dryer 60 feet long with a capacity of 30 tons per hour with a complete sand handling equipment and grading screens. This machine will be used for the making of artificial stone.

They have also just sold two dryers of smaller capacity for sand-lime brick plants, and January 2, they opened the new year by sending to Japan a dryer with a complete equipment for handling phosphate rock.

Kominuters for Cement Mills.

The firm of F. L. Smidth & Co., cement engineers and makers of cement machinery, 39 Cortlandt Street, report that among the contracts that they have recently taken is one for seventeen of their large size tubemills for the Pacific Portland Cement Co., Cement, California; and another one for twenty-four kominuters and tube mills for the new plant at Fogelsville, Lehigh County, Pa., of the Lehigh Portland Cement Co. Three additional kominuters are now being installed at the Mill "D" plant of the Lehigh Co.

Brought Them Some Good Orders.

American Process Co., 62 Williams Street, report that as a result of the indorsement of the convention consequent upon their reading of their paper on direct heat dryers they have already secured two orders, and are in immediate expectation of closing others. They say their dryer is becoming a favorite with the sand-lime brick trade, as their success in that branch will testify.

They also state that they have just closed a contract for four of their largest direct heat dryers for handling phosphate rock in the Tennessee district.

Spread of the Gas Producer System.

The Backus Water Motor Co., Newark, N. J., report a large growing interest in certain gas producers, not only throughout the United States, but also in Canada, as their many inquiries show. They have just closed a contract with the Holland Manufacturing Co., of Baltimore, for a 50 h. p. plant, displacing engines of another type.

For Reducing Alaska Gypsum.

The J. R. Alsing Co., 136 Liberty Street, slate that they are completing for the Pacific Coast Gypsum Co., of Tacoma, Wash., a line of machines for the reduction of the gypsum which they are getting in from Alaska, and for the mixing of the plaster made therefrom. They will be shipped about February 1.

They have also just received an order from a feldspar mill in Vermont, for one of the largest sized tube mills ever built by them, which, when running with its load in will total up forty tons.

Our Cement in South America.

Discouraging reports come as to the effort of American cement manufacturers to obtain a foothold in the River Platte section of South America. A number of prominent manufacturers who have tried it say that, first, the freights are against them, as the European mills obtain so much better rates; from New York to River Platte being \$4.80 per gross ton, and from Hamburg is between \$3.00 and \$3.20 per gross ton. The difference is accounted for by the fact of our lesser trade with these countries so that our ships return in ballast, while the European ships return with full paying cargoes.

Then the higher price of labor, making an increased cost of manufacture despite all our labor saving appliances, operates against us. This prevents the mills that are near the coast ports from being able to compete with the foreign trade; and when they can not then the case of the inland mills with their long hauls and freight charges is about hopeless. So without regard to whether the market there is or is not favorable to the sale of cement, the prominent fact remains that American cement is badly handicapped in trying to get into that market.

New York Brick Men Have a Good Time.

The season's closing prices of \$11.00 to \$11.50 have made all the brick manufacturers as well as dealers, feel pretty good and there was a gathering of over 600 of them at the Murray Hill Lyceum on the 18th as the guests of the John B. Rose Co. The meeting was described on the programmes as the "Hot Air Pow-Wow," and the guests were tutored with that inscription. There was a brief business meeting at noon, followed by a lunch and then a vaudeville entertainment. Every one was in the best of humor and the fun was unbounded.

GREATER BOSTON.

BOSTON, MASS., January 17.—The new year has opened auspiciously for the building trade in this vicinity. There has been absolutely no weather embargo, and both in the city proper and suburbs construction work proceeds with little or no interruption.

Mayor John F. Fitzgerald, after a strenuous campaign, has been installed in office and has already started to make good his promise of a bigger, better, and busier Boston. In his inaugural address he dwelt at length upon needs of a new city hall and proposed for its site a part of the Public Garden plot. Though there is opposition to the proposed site the fact can not be gainsaid that in the near future Boston will have a new municipal building capacious enough to house under one roof the officers of the various departments.

The Fireproof Penetrable Brick Co., Portland, Me., has been incorporated under laws of Maine. Capital stock \$150,000.00. Officers: President, I. C. Labbey, of Portland, Me.; treasurer, H. L. Greeley, Portland, Me. Object, mining clay and manufacture of silica brick, etc.

The interests of the Red Plaster Co., of Calais, Me., have been purchased by J. B. King, of Staten Island, N. Y., the largest manufacturer of calcined plaster in the world. Under Mr. King's management the business will be boomed. The capacity of the plant will be enlarged at once, the dock facilities will be increased by an addition of 400 feet to the present structures and new machinery will be added. Day and night shifts will be worked.

L. L. Atwood, of Pittsfield, Mass., is to establish a plant for the manufacture of concrete blocks and expects to have it in operation before spring. He plans to make regular blocks, also fancy pieces for cornices.

The Commissioner of Public Works of Providence, R. I., has awarded contracts for cement amounting to nearly \$14,000.00 to H. R. Horton and W. M. Harris, Jr., of that city. Mr. Horton gets the natural cement and Mr. Harris the Portland variety.

People from Burlington, Vt., have recently visited Jamaica, Vt., to look over the ground and to procure samples of the limestone deposits on Turkey Mountain. Twenty years ago there were several lime kilns in operation in that part of the town, but they were abandoned because of the excessive cost of getting the lime to market. Lately conditions have improved and now the lime can be loaded almost from the kiln into standard gauge cars.

The land where deposits occur is well covered with small hard wood timber suitable for fuel to burn the rock. It is expected that these deposits will be worked in early spring.

PITTSBURG, PA.

PITTSBURG, PA., January 10.—Authorities state that the year just closed has been one of the most prosperous, that Pittsburg, and in fact, the entire Pittsburg district, has had for many years. This, of course, applies particularly to the concrete, clay, and sand industries, and here this means much in the building trades, for the amount of building that has been done in the past year is almost unprecedented. Prices too, have been unusually well maintained, and in many instances, have gone far beyond the most sanguine predictions made during the early part of the year.

There has been little difficulty experienced from labor troubles, and the workers in the various crafts have been receiving excellent wages, far better than in the majority of the cities of the importance and size of Pittsburg.

There has been a vast amount of building going on, and it may be remarked that fully 75 per cent of it has been of the better grade, and of a substantial nature. In fact, the building trades have been so rushed for the greater part of the year, and even now have so much contract work on hand that there is but little cessation in their work now, even though winter is about half gone. Most of the concrete work has had to be abandoned until spring of course, but even in this line, there are a number of large contracts that are being pushed to completion, notwithstanding the danger of attempting this class of construction in the wet and freezing weather.

The companies manufacturing blast furnace and open hearth brick for the iron and steel mills report that on account of the heavy demand for new linings and repair brick, they are running their plants to the limit of their capacity, and are still unable to keep up with their orders. This is not the case with one or two of the largest of the manufacturers, but is the general condition in the entire vicinity, and from the way that demand for this class of material is coming in, and at the same time increasing, there is every reason to believe that the business will not fall off to any great degree for many months to come.

The Pittsburg and Lake Erie Railroad Co. has been granted permission by the borough council of Esplan to construct a concrete retaining wall along River Avenue, and paralleling their tracks. It is not expected however that actual work will commence until the weather breaks in the spring. The contract will be an important one.

Work on the 1,200 foot retaining wall that the Pennsylvania railroad is erecting at East Pittsburg, has been stopped by the advent of winter, and contractor S. A. Simms says that it will be impossible to do much, if anything more on the contracts for the next few months. This will also delay the work on the new station.

The concrete work on Bridge No. 10, on the Baltimore and Ohio railroad has been completed, and it is claimed by the engineers that it is the largest concrete bridge foundation in the country. It consists of two shore abutments and nine piers.

Work is progressing rapidly on the reinforced concrete warehouse, that Demmler & Schenck are building at 432-434 Penn Ave., Pittsburg. This is the first building of this description that has ever been built in this city, and the outcome is being watched with interest by other builders. There will be no structural steel used in the construction, and the building will be 38x113 ft. and 102 ft. in height. The floors will be constructed to withstand a weight of 250 pounds to the square foot. A peculiar feature is the fact that the walls are but four inches in thickness. The cement that is used is made from Portland cement and crushed sandstone, no gravel being used. H. L. Kreusler is the contractor, and expects to have the building completed early in April.

Henry Robinson, receiver for the Pittsburg Concrete Co., has been allowed by the court to resign, and Charles M. Johnston has been appointed as his successor. The plant of the company will be operated as before.

The Buckeye Wall Plaster Co. will erect a plant at Youngstown, Ohio. Their plant below Pittsburg has been unable to adequately fill all of the orders that have been coming in to the company.

A reinforced concrete storm sewer will be built at Altoona shortly. It will be built by the city, will be 1,700 feet in length, and will cost about \$30,000.00. Bids will be advertised for later.

The Pennsylvania Clay Co., manufacturers of Parks & Brody's Run standard paving brick and block, has removed the offices from Rochester, Pa., to the Germania Savings Bank Building, Pittsburg. The company has four factories, with a capacity of 50,000,000 pieces annually.

CHICAGO, ILL.

CHICAGO, ILL., January 22.—The winter season up to this writing has been an open one and all outdoor operations in the building line have progressed most favorably and with but little hindrance. The building of the great caissons under the new courthouse have just been let to the George A. Fuller Co., who were awarded the construction of the foundations for \$220,000.00. There will be 126 of these, each 110 feet deep, and 7 feet in diameter.

The building permits issued during the week just closed were only fifty-nine, the cost figuring up \$629,650.00 as compared with \$691,450.00 the week previous. Every one interested in real estate and building expects to see a greater degree of activity in building during the coming season than prevailed during the season of 1905, when the building gain for the year was 42 per cent, reaching an expenditure of \$63,155,620.00.

The cement business awaits a greater opening as soon as the winter season is over. Cement men say the season coming promises to be one of the greatest in the history of this city. Concrete also will be used in the various ways more largely than ever before, not only here, but all over the country. Many new firms have determined to enter the field next season. An indication of progress in this line is indicated by the large sales of concrete machinery as made by the Contractors' Supply and Equipment Co., with offices in the Old Colony building. The sales of Smith mixers for the first half of January have been larger than were made before during the entire month.

The lime business is very quiet, as was to be expected at this season of the year, but it will take a fresh and vigorous start as soon as the coming season opens.

The Wisconsin Lime Co., Chamber of Commerce building, report excellent prospects for the season soon to open.

The Union Lime Co. report business very quiet at this time.

The Stearns Lime and Crushed Stone Co., 165 Randolph Street, also report the lime and stone business as very quiet. The outlook, however, for the next season, all agree in saying, is exceptionally good. The attempt, or what was talked about among some lime men last month to advance the price of lime to 90 cents per barrel, did not pan out. The trouble is that lime is too plentiful and there are too many dealers in the field here who are only too glad to accept 65 to 70 cents per barrel for all the lime wanted. The upper price is the extreme rate asked.

The terra cotta makers, one and all, are exceedingly hopeful for a large business the coming year. The demand for terra cotta has very largely increased during the last few years, and its employment in building operations, both for practical and ornamental uses, has very largely increased. The yards are busy, and the owners say they have many large orders on hand which will be delivered as soon as the coming season opens.

A great new structure for the Chicago Telephone Co. is planned, as an addition to the present building at Washington and Franklin Streets, and is expected to cost \$750,000.00 to \$1,000,000.00. Preliminary drafts of architects show a skyscraper sixteen or eighteen stories high. President Arthur D. Wheeler said to your correspondent that "Inventions and progress in the manufacture and use of appliances demand an enlargement of our facilities in the future, and we are preparing to meet those demands which our increasing business imposes on us." Work on the structure will be rushed as soon as an equitable agreement with the city is closed.

Some builders are a little apprehensive that some of the skyscrapers will cease going up for a while, owing to the strikes among the workmen. Complaint is made against the George A. Fuller Construction Co., and grows out of a demand of the New York iron workers for an increase from 56½ to 62½ cents an hour.

The report current some little time ago that the Allis-Chalmers machinery plant here would be removed to Milwaukee is not borne out by the facts. Instead of moving away, Mr. Job, who is connected with the big firm, says the company contemplates the enlargement of the factories at 630 Elston Avenue and at Twelfth Street and Washenaw Avenue. The other establishments reported to have left the city are still here, and have no intention whatever of removing.

LOUISVILLE, KY.

LOUISVILLE, KY., January 22.—The outlook in this section for concrete work of various kinds has never been more flattering. During the past year a number of structures and smaller jobs were completed, which have apparently stimulated a demand for this character of work, and the indications are now that the operators in the concrete industry will have a busy year of it. The construction of the Belknap Manufacturing Co.'s building of reinforced concrete has created a mild sensation and has elicited considerable favorable comment, so that other structures along the same line will quite likely be erected during the present year.

It has been rumored that the new structure at Fourth and Walnut Streets, plans for which are now being drawn, will be of reinforced concrete construction, although, there is no authority for a statement of this kind. The building outlook generally is most favorable, and dealers in lime, cement, etc., are all looking forward to a year of great activity.

The National Concrete Construction Co., in the Board of Trade building, through Mr. Ohligslager, reported that they were figuring on a vast amount of concrete work, and looked forward to the most active year in the history of their organization. They have just completed the construction of a round house at Corbin, Ky., which we hope to illustrate in the near future. They have also completed some smaller jobs around the city and are now preparing for some larger work just as soon as the season opens.

The Southern Roofing and Paving Co. report that they are just as busy as they can be, unusually so for this time of the year. This is applicable to both branches of their business, roofing and concrete construction. They are now working on a large job of roofing at Corbin, Ky., and have other work of no less magnitude. Of concrete construction they have considerable inside work and are figuring on a very active year in this line.

The Fitch-Troxell Co., 108 Third Street, report that they have had a very satisfactory year in 1905 on concrete construction, and are at the present time figuring on considerable other work. They had nothing especially new to report, further than that they looked for a good year and were in a position to take care of considerable work in the concrete line.

The National Roofing and Supply Co., have enjoyed a good demand and are at the present time quite busy. In addition to roofing this concern does considerable concrete work and is enjoying a nice business in this line.

J. B. Speed & Co. report that the business in lime and cement has opened up in a very satisfactory way for the new year, and Mr. Gray said that they were well pleased with the outlook. Their Portland cement plant at Speeds, Ind., is about ready for operations and they expect an active demand for this commodity.

The Western Cement Co. say that the outlook for natural cement is more favorable than ever. They had a good year in 1905 and they expect an even larger demand during the coming twelve months.

The Union Lime and Cement Co., which is owned and controlled by the Utica Lime Co., are enjoying a nice business, both in Portland and natural cement, and lime. The indications are for a good year and they are well pleased with the prospects.

The Kentucky Wall Plaster Co. are enjoying their usual active demand for hard wall plaster, which is continually increasing, and Mr. John Campbell reported that conditions were in every way satisfactory.

The Concrete Building Block Co. enjoyed a good year during 1905 for concrete blocks, although there was not a large number of big jobs of this kind done in this section of the country. The outlook for this kind of construction is much more favorable than ever before, and they anticipate a good year just as soon as the weather permits it.

W. F. Nugent & Bros., large dealers in Ohio river sand and gravel, are quite busy, considering the fact that this is the winter season and the demand is generally small. They anticipate a very large year on account of building operations in this city and are preparing accordingly.

The Ohio River Sand Co. are enjoying good demand for river sand. They supply considerable sand for street work and as a number of streets will be improved in the city during the present year, they are hopeful of one of the best years in their history.

The Louisville Fire Brick Works, Highland Park, Ky., say that they still find themselves full up on orders for their output. Despite the fact that improvements and increased capacity are continually being made, the orders are always in excess of their output. They are still working over time, endeavoring to meet the demand.

Scott Newman, a large dealer in river sand gravel reports unusual activity at this season of the year, and feels much encouraged over the outlook.

The Louisville Pressed Stone Co. is the name of a new organization which has been formed here with a capital stock of \$10,000.00, by John E. and Frank Simon, and J. H. Meyer. Mr. Frank Simon is now constructing a house at 239 E. Walnut Street of these blocks which he will doubtless occupy. They have purchased the American hydraulic machine, of the American Hydraulic Stone Machine Co., of Denver, Col. They are contemplating the erection of a large plant in the southern part of the city, and expect to enter largely in the concrete block industry.

The Falls City Artificial Stone Co., through Mr. Robertson, said that the past year had been a good one for the concrete industry. He reported that they were now figuring on a large number of contracts and looked for a big year in concrete.

MEMPHIS AND THE SOUTHWEST.

MEMPHIS, TENN., January 17.—The construction work in Memphis continues in an unabated way. All building materials are bringing a good price and often times deliveries are impeded by the large number of orders.

The Memphis Sand and Gravel Co., which was recently organized, is preparing to go to work soon, and with that end in view has purchased the steam tug Lucius, Jr., from the Illinois-Missouri Bridge Co., of St. Louis, which is to be used in hauling the barges of the company.

The Memphis Granite Brick Co., on account of its largely increased business, has increased its capital stock from \$20,000.00 to \$75,000.00. The company will not limit its operations to the manufacture of sand-lime brick, but will make hollow concrete blocks of the same material, as well as the solid blocks for building purposes. This class of material is becoming very popular in the South and makes a handsome, durable building. The Memphis Granite Brick Co. was organized nearly two years ago and since that time has enjoyed a lucrative business. The plant is located at the foot of the Tainor Avenue. Bolton Smith is president of the corporation, and H. P. Johnson, vice president. The company will secure its sand from the unloading plant of the Memphis Sand and Gravel Co., at Nonconah, the material to be conveyed to the brick works in the sand company's cars.

The scarcity of brick and sand has been a problem confronting the Memphis builders and investors for some time. Brick has been shipped into the city at a great expense, causing an increase in the expense of building. The Memphis Granite Brick Co., and the Memphis Sand and Gravel Co., propose, with their increased facilities, to lessen the scarcity of the material in the city. The future operations of the company are to be larger than are generally comprehended. The American Car and Foundry Co. is now making twelve cars for the corporation, and more will be built as the business demands. The company has a contract to furnish sand and gravel for ballasting the road beds of the Illinois Central and Mississippi Valley railroads. The Illinois Central has completed its spur to the plant which is located on piers over the river. The railroad company has built three tracks and has 400 feet of piling or 750 piles extending into the river. The erection of the plant of the Memphis Sand and Gravel Co. is only a part of the great improvements that are being made in South Memphis and Nonconah territory. Docks and piers will be built and a freight depot is projected for South Memphis.

ARKANSAS.

A contract has been awarded the Arkansas Rock Asphalt Co. to repair the West Markham Street pavement at Little Rock, at \$1.30 per square yard, of asphalt surface actually laid.

The Monticello Cement Stone Co., of Monticello, Ark., has been incorporated with a capital stock of \$10,000.00. H. F. Bailey is president; C. C. Thompson and C. F. Hudspeeth, directors.

The Cave Creek Stone and Development Co., of Batesville, Ark., has been incorporated with a capital stock of \$50,000.00. The officers are: Martin R. Thayer, president; Robt. R. Case, vice president; John E. McCormick, secretary; and Ernest Neil, treasurer.

A. C. Townsend, of the Nashville Roofing and Paving Co., which has had some contracts in Little Rock, has gone to Boston for a few days.

About thirty years ago, the Bartholomew Gravel Roofing Co. invaded the Arkansas field and many prominent buildings of the city that were roofed by them at the time have stood the test of years splendidly. Many escapes from fire have been attributed to the roofing. The company has its business centering around Memphis, but are now regularly identified with Arkansas as well. Their Little Rock branch is at 108 East Markham Street.

KANSAS.

The Kansas Portland Cement Co., of Iola, Kan., will let the contract this month for the belting to be used at the plant during the coming year. The contract is a big one as the company uses a great deal of belting during the year and there have been nine or ten representatives of different leather companies to Iola for the purpose of putting in bids on the contract. According to the statement of one of these representatives the contract during the year will amount to nearly \$25,000.00.

At the convention of the Kansas Brickmakers' Association, held at Independence, Kas., a few days ago, the following officers were chosen: President, J. J. Amos, Humboldt, Kan.; vice president, Robt. Nesch, head of the Pittsburg Vitrified Brick Co.; secretary, E. R. Dick, of Coffeyville, Kas.; treasurer, A. W. Shulthis, of Independence, Kas. It was recommended that the common brick henceforth be made in the following uniform size: $2\frac{1}{4} \times 3\frac{3}{4} \times 8\frac{1}{4}$. The association is now composed as originally, of twenty-six plants. As regards the proposed merger of all the brick plants of Southeast Kansas it is stated that the option on these plants has been extended from January 1, 1906, to March 31, 1906.

J. W. Grund and Henry McGraw, of Kansas City, Kas., have been in Atchison trying to purchase 200,000 vitrified brick. Atchison makes only half as many bricks as it can sell.

The State Charter Board has recently issued a large charter, that of the Indiana Portland Cement Co., of Neodesha. The capital stock is \$1,500,000.00. Of this amount \$600,000.00 is preferred and \$900,000.00 is common stock. This will make the biggest cement plant in Kansas. The officers are: C. F. Ritter, of Covington, Ky., president; John A. Cruikshank, Bellefontaine, Ohio, vice president; Dwight Harrison, Columbus, Ohio, secretary; E. E. Tyler, Neodesha, treasurer. The directors are: Dr. Louis Olf, of Piqua, Ohio; G. P. Steinlage, Piqua, Ohio; M. J. Gottschalk, Ashtabula, Ohio; J. L. Ballinger, Plain City, Ohio; O. V. Wilson, E. B. Hayden, Robt. Nesch, R. W. Hocker, of Kansas City, Mo.; A. L. Hill and A. M. Sharp, of Neodesha; H. H. Pickering, East Orange, New Jersey.

G. E. Anthony, of Manistee, Mich., has been prospecting with reference to a sand-brick factory at Wichita.

At Fort Scott, Kas., the Ft. Scott Brick Co. is now operating extensively in the manufacture of vitrified brick. It is located on Hill Street, at the corner of Mulberry. The officers are: C. W. Peniman, president; E. C. Gates, vice president; H. E. West, secretary and manager, and Grant Hornaday, treasurer.

One of the fastest growing institutions of Wichita is the Sillex brick manufactory in the making of sand-lime brick. During the past four months the company has had to double the capacity of their plant and run night and day to fill the constantly growing demand for Sillex brick. The company is now turning out 40,000 finished bricks every twenty-four hours.

F. M. Benson, a cement block builder, has leased the stone building on North Main Street, at the corner of Sixth Avenue, Winfield, Kan., and will start a cement block factory.

The Star Brick Co., of Iola, Kan., is one of the successful brick plants in the natural gas belt. It furnishes employment to thirty people and has a capacity of 40,000 brick per day of common building brick. It is equipped for repress, vitrified and common building brick and turns out a high class product.

The Coffeyville Vitrified Brick Co. started in 1888 by the Francis family, and later gigantically developed by W. H. Mahan, has had a fine history too, as a brick making concern. E. R. Dick is secretary and manager and W. G. Buckley is treasurer. Their plants, five in number, are located at Coffeyville, Cherryvale, Independence and Chanute, Kan., and Denton, Texas with general offices at Coffeyville.

TEXAS.

The contract for the construction of the Post Pipe Tiling Co.'s factory buildings on Rose Hill,

has been let. The buildings will cost \$125,000.00, and according to the terms of the contract, must be completed within sixty days. The plant when in operation will give employment to about sixty persons, with a weekly payroll of \$700.00.

MISSOURI.

Henry Hess, of Iowa, has come to Joplin, Mo., and started a large lime factory. He has a patented process that makes a lime not as white as the ordinary, but which is claimed to be of superior quality and can be made cheaper than the pure white lime. The plant at present has a capacity of 150 barrels per day, but ultimately will make 600 barrels a day, extensions already having been planned.

I. C. Wheeler, owner of the Carthage, Mo., brick yards, contemplates organizing a company to manufacture tile and drain pipe.

OKLAHOMA.

The Baldy Mountain Red Stone and Lime Co., of Canton, Eagle City and Thomas, has been chartered with a capital stock of \$60,000.00. The following are the incorporators: J. W. Osborne, of Salem, Mo.; W. H. Cloe, of Bentonville, Ark.; Rush Elmore, of Thomas, O. T.; S. R. Roth, of Canton, and C. A. Reynolds, of Harper.

THE WEST COAST.

SAN FRANCISCO, CAL., January 12.—The Bekins warehouse, now in course of construction, at Thirteenth and West Mission Streets, San Francisco, is a six-story structure costing \$32,000.00. The columns, beams, girders and floors are of reinforced concrete, Kahn system. R. W. Hart is the architect, M. C. Couchot engineer, and Gray Bros., the contractors. This is the first building to be constructed on this system in the city.

The Marysville, Cal., public library, recently completed, at a cost of \$65,000.00, has reinforced concrete floors, beams, girders, columns and lintels, all built on the Kahn system of reinforcement. W. Curielt is architect and M. C. Couchot engineer.

The California Gas and Electric corporation used the Kahn system of reinforced concrete in the construction of the floors in the new Martin power station, erected at cost of \$100,000.00, six miles south of San Francisco. An immense gas works plant has been constructed to furnish gas for the three 5,000 h. p. gas engines which will drive three electric generators at this power house to operate the United Railway system in San Francisco. A two-story sub-station for the Standard electric transmission system at Redwood City, Cal., will be built of reinforced concrete, Kahn system at a cost of \$3,500.00.

The fine reinforced concrete inter-county bridge over the Stanislaus River at Ripon, Cal., is completed, and will be opened for traffic on January 11, when the supervisors of San Joaquin and Stanislaus counties will accept it. It is the first of the kind constructed in this part of the San Joaquin Valley, and is said to be practically indestructible. It has two 100-foot spans, and corrugated steel bars are imbedded in the concrete.

The San Francisco cement market is still strong, although prices have declined with the falling off in building since the rains commenced and the arrival of considerable foreign and some domestic cement. The arrivals of foreign cement during the past month aggregated 40,000 barrels. There is still a large amount afloat for this port. James Maynard, Jr., estimates that 25,000 barrels of Alsen's Portland cement alone, will arrive during the next four weeks. The California manufacturers of cement are anxious to control the field, but are enlarging and building new plants in an effort to supply the growing market. Quotations for foreign cement at the wharf are now \$3.25 to \$3.50 for such as Alsen's and Dyckerhoff's. Others range from \$3.00 to \$3.10 a barrel. A large dealer says that he is confident that no foreign cement will sell below \$2.75 for at least eight months. Freight rates from Europe remain high, 22s 6d.

Building construction is expected to improve rapidly during the next month or two and to be lively for at least two years to come. Cement manufactured in California is quoted at about \$2.10, San Francisco, and less than \$2.00 at the mill in good sized lots. The importation of cement helps the California farmer, as it enables foreign vessels to charge a reasonable rate for wheat exported, provided they can secure cement cargoes instead of having to come here in ballast.

The Monterey Brick Co. has manufactured about 250,000 sand-lime bricks, by the Schwarz process at its new plant recently placed in operation at

Seaside near Monterey. Fine white sand is taken from the Bay Shore. The company has been disappointed as to the railroad facilities promised, and has ordered a traction engine for land haulage and a wire cable landing equipment for loading vessels off shore. This will make the company, which has a capacity of 30,000 bricks daily, independent as to transportation facilities. Negotiations are in progress for disposing of the entire output of the factory in advance to San Francisco building contractors.

The Pacific Construction Co., of San Francisco, will build the new manufacturing plant of the Bowers Rubber Co. at Black Diamond, Cal. There are to be six large buildings of reinforced concrete, and when the first two or three buildings have been completed the company will remove its factory from this city to the new location. Work will be commenced on the first building during January. It will have two stories and cover an area of 60x200 feet. The work will be of a very substantial character with corrugated steel bars in the concrete. This company has just completed for the county of Stanislaus a single-span reinforced concrete bridge across Dry Creek at Modesto, Cal. The span of 120 feet is one of the longest ever constructed on this system. Corrugated steel bars are used in the construction.

The completion of the Rose Firebrick Co.'s plant at Oakdale, for the manufacture of magnesite firebrick from the magnesite ore, mined near Livermore, Cal., has stimulated prospecting for this rare substance. Extensive deposits of magnesite have been located in Tulare County, and elsewhere. Additional factories will probably be constructed as several terra cotta plants on the Coast are making interesting experiments on magnesite, with a view to engaging in the manufacture of magnesite firebricks. The great difficulty is to build a kiln sufficiently refractory to withstand the heat needed to burn these bricks. There are no magnesite mines in the United States outside of California.

The government engineers have completed a survey for the proposed breakwater for Monterey Bay. It will be half a mile in length and at the outer end will reach a depth of seventy-two feet. At the base it will be 150 feet wide, being slightly narrower at the top. One million tons of rock will be used in its construction and the cost is estimated at about \$1,000,000.00.

Alex Rosborough, J. P. Churchill and J. W. Churchill have extensive limestone claims in Butte Creek Valley, Siskiyou County, Cal. It is claimed that the stone has been tested and found to have contained 98 per cent of lime.

The Pacific Proof Plaster Co. has been awarded a contract amounting to \$21,000.00 for the new library of the Southern California Medical College at Los Angeles.

The annual meeting of the Bakersfield Sandstone Brick Co., of 1705 Nineteenth Street, Bakersfield, Cal., was held here December 26, 1905.

Col. E. A. Forbes and associates, of Sacramento, Cal., are said to have acquired the patent rights for the manufacture of sand-lime brick in this locality, and will build a large plant here. The Yuba river sand is to be used, and the lime will be procured from the lime kiln ranch, recently purchased.

The Menlo Rock Crushing Co. has been incorporated at Redwood City, Cal., by a number of San Francisco capitalists, having homes in San Mateo County. The directors are: C. N. Felton, S. E. Slade, J. A. Donohoe, E. W. Hopkins and James L. Flood. The company contemplates installing a large rock crusher at a quarry to be developed on the Britton Ranch. Road material will be supplied, both for private and commercial uses. The steamship Luxor has arrived with 8,000 barrels of Alsen's Portland cement. Prices for February, March delivery, are \$2.90 for the foreign article.

The Jameson Lime Co. has been incorporated at Los Angeles, Cal., with a capital stock of \$300,000.00, by C. A. Canfield, J. A. Chanselor, J. M. Danziger, J. W. Jameson and L. M. Jameson.

Thomas Barbour, of the Risdon Iron Works, of San Francisco, is preparing for the erection of a large electric water power plant on the Feather river in Butte County, Cal. The plans include the construction of a large dam on the Feather river, and the laying of a concrete canal from the dam to the proposed power plant.

The Pacific Coast Gypsum Co., of Tacoma, Wash., is constructing extensive warehouses and docks at that place. W. K. Nichols, general manager of the company, states that the buildings will be three stories high, and will have a frontage of 85 feet on the water front, and a depth of 134 feet. Special machinery for the treating of gypsum will be installed.

The Puget Sound Portland Cement Co., of Seattle, Wash., has been incorporated with a capital stock of \$1,000,000.00 by J. A. Soderberg, W. H. Walter and others.

The Atlantic Portland Cement Co. has filed articles of incorporation in San Francisco. The company has a capital stock of \$5,000,000.00, the incorporators being: W. C. Webb, Edmond Schwab, W. S. Downey, D. V. Harwood and A. F. Morrison.

Engineer T. H. Humphrey, engaged on the Klamath river project, in Southern Oregon, says that bids will be called for at once for a supply of cement. The government purchases the cement and furnishes the contractors with the amount that is necessary for the irrigation project. Bids will also be called for on the construction of two additional sections of the project.

NEW ORLEANS, LA.

NEW ORLEANS, LA., January 20.—It is said that the fireproofing of the wharves and the warehouses of the Illinois Central railroad is the largest single contract of the kind in the United States to-day. The aggregate is one and one-fourth million square feet or thirty acres of floors and roofs. All the steel construction is protected with concrete, rendering it absolutely fireproof. Over 150 cars of cement was used in the work and thirty trains of thirty cars each was required to deliver the stone and sand for the work. The stone was from quarries in Kentucky situated along the line of the Illinois Central railroad. The sand was delivered by local contractors and was from the nearby lake. The cement used was manufactured by the Illinois Steel Co., and is the Universal brand.

This is possibly the most rapid piece of construction work that has ever been done in the South. The docks and elevators of the Illinois Central railroad, the Stuyvesant docks, were totally destroyed by fire February 28, 1905. Before the ruins were cold contracts had been let for the rebuilding of the docks, and the wharves and elevators on a much larger scale than before. James Stewart & Co. were awarded the contract for building the wharves and warehouses. The building of the elevators was awarded to Swift & Co., of Chicago. J. H. Frederickson, of Stewart & Co., was given charge of the work and organized his working forces March 4, four days after the fire. Eight hundred men went to work on the wharves and warehouses and two hundred on the elevators, and they were completed in September.

For all the fire proof work $\frac{3}{4}$ inch crushed limestone was used, and on the heavy concrete work $2\frac{1}{2}$ inch crushed limestone was used. The fire walls contain 1,600 lineal feet, aggregating 5,000 cubic yards. These walls are started below the low water line and are 18 feet in height. All the concrete work was completed in four months time.

Other immense docks are under construction by James Stewart & Co. The Chalmet docks for the Frisco road, which will also be immense affairs.

Had a Good Year.

BIRMINGHAM, ALA., January 20.—The Alabama Sand and Supply Co. write us: "Our sand business was excellent in 1905. We also did a nice business in crushed stone and Southern States Portland cement. The following companies have recently been organized for the manufacture of hollow concrete blocks: The Cement Block Manufacturing Co., W. G. Oliver and Robt. Jemison, Jr., proprietors; The R. E. Cooper Block Co.

The Pacific Sand and Gravel Co., of Los Angeles, Cal., has been organized. The capital stock is \$25,000.00. The directors are: W. R. Leland, F. M. Parker, John L. Hayes.

The Tom River Gravel Co. has been organized at Camden, N. J., to deal in sand, gravel, dirt, etc. The capital stock is \$50,000.00. Walter Spooner and George C. Tilden, Philadelphia, Pa., and Wilfred B. Walcott, Camden, N. J., are the incorporators.

The Milltown Sand and Clay Co., Jersey City, N. J., has been incorporated to deal in sand, clay, etc. The incorporators are: F. W. Hastings, Jr., Geo. J. Fernier and James E. Pyle. The capital stock is \$125,000.00.

The Atchison Gravel, Sand and Rock Co., has been organized at Atchison, Kan., with a capital stock of \$5,000.00.

The America Sand and Gravel Co., of Chicago, Ill., has increased its capital stock from \$5,000.00 to \$100,000.00.

Sand and Gravel

Will Operate Immense Plant.

A number of prominent operators residing in Chicago, Ill., have just purchased a tract of 100 acres of gravel land in South Beloit, Wis., on which is to be erected a mammoth screening, crushing and washing plant to supply the immense demand for sand and gravel in the Chicago market. The capacity of the new plant will be 100 cars daily of crushed and screened sand and gravel. This will be the largest organization of its kind in that section of the country. Negotiations for the purchase of this property have been under way for some months, and as it was necessary to take care of a number of details regarding switching facilities and other important affairs, the operations were necessarily slow. The exact location of the tract is adjacent to the gravel pit of the Northwestern Railroad and it is a little less than a mile from the State line of the southern extremity of what is known as the Miller tract.

This gravel hill has been known for some time as possessing a very superior quality of sand and gravel and is located about forty feet above the water level. The most modern equipment will be installed, consisting of a hydraulic dredge which will be placed on a scow in the artificial lake which will be formed. The water level in this lake will be about forty feet below the ground level of the hill and excavations will be made to remove the gravel for a distance of about twenty feet below this level which will make the excavation reach a total depth of sixty feet. The supply of gravel will last for many years, notwithstanding the fact of the large daily output.

The dredge will be erected on a centrifugal or sand sucker design of the latest pattern, and the capacity of the dredge will be 7,000 gallons per minute of sand, gravel and water, which will be raised to a height of more than 50 feet to the top of the tower of the crushing and sifting plant and its workings will be nearly all automatic. It will be so arranged that the revolving screens can separate the material into four or five grades of sand and gravel. The largest gravel will be passed to the crushers where it will be reduced to crushed stone. The various varieties of sand will be conveyed to a separate bin where it will be stored for shipment. These bins will also be erected above the tracks so that the sand will run by gravity through a hopper into the cars.

The hydraulic method of handling cars is one of the latest methods and has been used successfully in other large operations recently. The company will employ a large number of hands and the operations will be carried on on a large scale. Great inducements are now opening in this section of the country for the manufacture of sand-lime brick, cement brick and concrete blocks and other concrete specialties, owing to the fact that washed sand and gravel can be supplied at a very small cost. The name of the individuals composing the company have not been given out, but Mr. W. H. Wheeler is back of the organization.

Forms Big Sand Company.

The Irving Sand Co. has been incorporated at Mayville, N. Y., to produce, purchase and sell sand and gravel, as well as manufacture and sell all or any of the products of same. The capital stock of the new organization is \$24,000.00, of which amount \$500.00 has been paid in. The principal business offices of the company will be located at Silver Creek, N. Y. Jno. W. Peglow, John B. Webster, Geo. A. Shoner, Jno. J. Jackie, all of Silver Creek, are the directors. The company will begin operations immediately.

The Gowanda Sand and Gravel Co., of Gowanda, N. Y., has been organized with a capital stock of \$10,000.00. The company will manufacture and deal in cement, brick and lime. The incorporators are: M. P. Kellogg, Gowanda, N. Y.; D. L. Tuttle and Fred E. Pond, of Buffalo, N. Y.

Big Deposit of Gravel.

STERLING, ILL., December 18.—An extensive and valuable tract of gravel has recently been discovered in Polk county, Ill., by the Chicago Northwestern Railroad Co., which they will probably purchase for use as ballast. The bed is 240 feet in extent and the tests that have been made show it to be about 45 feet in depth. The gravel is entirely free of earthy matter, and the deposit is covered by soil which varies in depth from one to five feet. The estimated value of this tract is \$45,000.00. As the gravel deposits in Iowa are becoming very limited, the railroads are seeking new fields for operations, and it is stated that a number of very valuable gravel deposits are located in a number of sections throughout this State. The bed in question is located about one and one-half miles from the Northwestern railroad and is seventy feet above the river level; besides being perfectly accessible to other railroads. It is understood that negotiations are under way for the purchase of the same.

New Sand Organization.

WAVERLY, Mo., December 22.—A company has just been organized here by J. R. Tuscom, William Matthews, of Kansas City, Mo., and S. H. and H. G. White, of this place. The capital stock of the new organization is \$50,000.00, and the company will engage in the sand business. The company has just purchased 100 acres of land containing a fine quality of building and plastering sand and the indications point to successful operations by the company, and in a short time it is expected that the company will be sending out something like 50 loads of sand per day.

Fine Gravel for Ballast.

FREMONT, NEB., December 18.—A deposit of coarse gravel of a quality particularly suited to ballast has been discovered in the bed of the Platte river near this city. The quantity is apparently inexhaustible and the Sioux City and Western Railroad is erecting a clam shell dredging machine in order to bring the gravel to the surface. It is the intention of the company to utilize considerable quantities of this ballast on the new line between Sioux City and Ashland, as well as upon other branches of its road.

Sells His Sand Operations.

TOPEKA, KAN., December 28.—Geo. Elliott has just disposed of his sand dip, including all of his equipment and other property in this city to the Stuart Sand Co., of Kansas City. The purchase price was \$10,000.00. This property has been leased for the past six years by the Southwestern Fuel Co., but it is the intention of the new organization to make some change, although it is believed that the Fuel Co. will still manage the plant.

Secure Valuable Sand Tracts.

BEAR LAKE, MICH., December 6.—Immense tracts of sand land extending along the Indiana and Michigan short line on Lake Michigan have just been secured by the Knickerbocker Ice Co., of Chicago, Ill. This company was awarded contracts for hauling into Chicago something like 100,000 cars of sand annually. This opens up an immense industry, and a large number of men will be given employment as these tracts are practically inexhaustible.

Burned Out But Rebuilding.

OTTAWA, ILL., December 6.—The large plant of the C. G. Dennis Sand Co., several miles from this city, was destroyed by fire several weeks ago. The origin of the fire is a mystery and the loss was total, including some valuable machinery which had recently been installed. The total loss is estimated at about \$10,000.00, with \$5,750.00 insurance. Matters were immediately straightened out and operations were undertaken to rebuild the plant. The construction of same is now under way, and will be erected on the same lines as the one which was destroyed. Operations will begin just as soon as the plant is completed.

The Western Sand, Lime and Brick Co. has been organized at Omaha, Neb., by M. E. Ashton, J. E. Boyce and M. O. Cunningham. The capital stock is \$200,000.00.

Quarries.

The National Quarry Owners' Association.

Meets Semi-Annually.

D. McL. McKay, Chicago, Ill. President
S. M. Hall, Bucyrus, Ohio. First Vice President
Chas. Pfeiffer, St. Joseph, Mo. Second Vice President
B. F. Frosney, Jacobsville, Mich. Third Vice President
B. H. Delebaugh, Louisville, Ky. Secretary-Treasurer

Official Organ, ROCK PRODUCTS.

Quarry Association Meeting.

The annual meeting of the National Quarry Owners' Association will be held at the Auditorium Hotel, Chicago, February 21 and 22. The first session will be held at 10 a. m., Wednesday. On the afternoon of the same day matters in which building stone quarriesmen strictly will be much interested will come up for discussion. Among other things that will be discussed at this time will be those of stripping and the application of drills and channeled, which every live operator will be glad to hear. The crushed stone interest will be taken up on the morning of the 22d, including the methods employed in quarrying and manufacturing crushed stone. At the afternoon session all other matters, including the election of officers and the matter of assisting the individual quarryman or particular district will be attended to.

The officers will endeavor to bring about the formation of two organizations. The object of one will be to promote the interests of the crushed stone men and the other the welfare of the building stone men. The presence and personal co-operation of every quarryman is desired in order to accomplish these objects of so much importance. What industry has a brighter future than this one? Still, nothing can be accomplished without an organization of strength. This is essential if the objects are to be realized.

It is to be hoped, therefore, that every operator will make it his business to be on hand at this meeting. Your views and suggestions are needed, and your earnest co-operation is most strongly desired at this time.

A Disposition for Waste Stone.

This is the quarry operators' season of inactivity. He is just between seasons and in resting from his labors of an active period, he surveys his belongings and casts about for new worlds to conquer with the coming of spring. He surveys his quarry, takes note of his equipment and prepares to increase this, and to make some preliminary arrangements by stripping and removing the top stone. In times gone by this top strata was waste product, only an encumbrance to his greater quarrying operations. He would gladly have disposed of it as a gift in order to get rid of it—but unfortunately every one else held the same views, and considered it as so much dross. It was piled high and encroached with appalling rapidity, handicapping his successful operation. It was his eye sore by day and his nightmare in the long hours between sunset and dawn. How to dispose of it was beyond his power of comprehension.

This continued until the use of concrete, road building and similar operations began to demand material of this character. Then came the big crushers, ever hungry, to be fed, and so the waste stone found an outlet which brought good returns to the quarryman.

It is quite probable that a considerable number of quarry operators are still dubious as regards this new feature of their business. They hesitate to invest in equipment to dispose of this waste stone, fearing that it is rather an experiment than a profitable branch of their industry. The successful quarryman to-day, however, is the man who notes the details. The crushing operation is one of the vital details which means not only a disposal of thousands of tons of waste stone, but

nets him a nice profit at the end of the season. Now is the time to give this theme some consideration, before the rush comes, and get in line for increasing your profits so that at the close of the coming season, your work will show a greater percentage of returns for your labors.

The Crushed Stone Man's Needs.

Perhaps there is no industry that has made greater progress than that of crushed stone. It has risen up like a wave on the business ocean, and hundreds have entered it with little or no knowledge of its actual requirements, and their success has only been small. Like all other enterprises, which meet with popular favor in a limited time, the crushed stone business has been accompanied by divers evils, of which few operators of crushing plants have ever fully realized.

All industries have their good and bad sides, and the stone crushing industry is not an exception. Some have doubtless entered this field seeing only the favorable side, and believing that a veritable gold mine awaited them. They have entered the field without due thought and with the least possible practical knowledge of its requirements. The result has not been satisfactory to them, and failure in some instances has been the outcome.

The first consideration is the proper equipment, the second the knowledge of what the plant is capable of doing, and third seeing that the capacity of the plant is a reality. The proper kind of stone, the right arrangement of the plant so as to obtain the best results, the most efficient help; these are considerations not to be lost sight of in the operation. Knowing the cost of your plant and its receipts are of no little moment, as upon these two items stand your success or failure.

Details too numerous to mention here must be considered by the successful crushed stone operator, all of which go toward his fortune or quickening his ultimate loss and ruin. The demand is good for crushed stone, nay it is steadily increasing, but it's up to the operator to make good, and this can not be done without knowledge of the proper kind.

Installing New Crusher.

L. R. Spong, of Harrisburg, Pa., who has been operating the Walton quarries, near Lemoyne station, Northern Central railway (Pennsylvania system) for some time, has purchased the quarry property and will install a new up-to-date stone crushing plant of large capacity, and remove and enlarge his fertilizer, lime and hydrating plant. He is at present completing his crushing and hydrating plants at Bonny Brook, G. and H. railroad, near Carlisle, Pa., and expects to have this in operation in the early spring.

May Install More Equipment.

NICHOLASVILLE, KY., December 28.—The Jessamine Home Construction Co. write us: "We are crushing rock at Nicholasville for road work. We use a Climax road outfit installed by Brinker. The capacity is 150 perch per day. Our plant consists of a 12-ton road roller-crusher, bins, 32 h. p. Fow gasoline engine, grader, 600 gallon steel water wagon and many small tools. We have a picture of the plant but it does not show the engine as it is in a house for its protection. To introduce the work it had to be done very cheap. We hope to do better. We are thinking of adding a concrete mixer and will build sidewalks to help out."

Preparing for Big Operation.

WAVERLY, IOWA, January 3.—The crushed stone industry here is again in active operation. Henry M. Young, the superintendent, recently returned from Chicago and has put on a considerable force. Considerable new equipment is to be installed in the near future. This will include two new boilers, of large capacity, an air compressor, a steam hoist, crane, etc. All of this has been ordered and will cost about \$35,000.00. The quarry will be stripped on the north side of the spur track, thus permitting the stone to be quarried from both sides of the quarry at the same time. About 125 men will be given employment when the plant is operated in full.

Has Changed Name.

ROCK FISH, VA., December 28.—The Southern Quarry Co., who manufacture screened stone for all purposes, write us: "The Southern Quarry Co. has changed hands, and is now known as the Rockfish Ballast Co. Business outlook good."

Establishing a Crushing Plant.

GOVERNEUR, N. Y., January 17.—Some time ago the Corrigan & McKinney Steel Co., of New York, purchased a plot of marble quarry property and are erecting buildings thereon. They will also install a crusher of forty tons capacity and two tubular boilers and an engine. The marble will be crushed and used for fluxing the steel. A switch has been constructed in order to facilitate matters and operations will soon begin.

Arranging for Big Plant.

A number of prominent citizens of Findlay, Ohio, will establish a stone crushing plant in that city. Two crushers will be installed, one of 300-yard capacity and one of 500-yard capacity. Work will be started in the near future and this will be the largest plant of its kind in that part of the country.

Increases Capital—Will Make Improvements.

FOND DU LAC, WIS., January 3.—A reorganization has taken place in the personnel of the Moser Lime and Stone Co. A. F. Moser has resigned as president and William Michelstetter, of Appleton, was elected to fill his place and also to act in the capacity of treasurer. J. T. Glover, of Milwaukee, was elected secretary. Examinations have been made by an expert regarding the composition of the stone at the company's quarries, near South Byron. He pronounced it to be the finest quality for macadam paving, as after being pulverized it forms a hard coating similar to cement. In this respect it differs from nearly all limestones, when used for such purposes, as it will not loosen and be carried away. On the strength of this report the company decided to increase its capital stock from \$25,000.00 to \$100,000.00. A number of improvements will be made at the quarry.

A New Crushing Operation.

ASHLAND, NEB., January 20.—A number of parties from Omaha and Lincoln have organized a company for the establishment of a crushed stone plant on Platte river, near here. Two crushers will be installed and about eighty men employed. A siding will be erected by the Burlington road to the plant and operations will be carried on in an extensive way. Preparations are now under way and it is expected that active work will be started in the near future.

Rubble and Crushed Stone Quarry.

EAST ST. LOUIS, ILL., December 20.—The East St. Louis Stone Co. write us: "We operate a purely rubble stone quarry for foundation work and a crushed stone quarry making macadam for street and road work and concrete. We do not cut stone nor operate a stone yard."

Adopting a New Method.

PITTSBURG, PA., December 21.—A new method of drilling and blasting is being tried at Brookville, Pa., by the Ferguson Contracting Co., of this city. Some very heavy work is being encountered for their steam shovels, which consist of a number of heavy cuts which extend from thirty to sixty feet in depth through shale and rock. Their method consists of a number of heavy cuts which extend from thirty to sixty feet in depth through shale and rock. Their method consists of drilling holes to subgrade, using two well boring machines with five-inch gauge, to a depth varying from twenty-five to sixty feet. It is the intention of this company to shoot a number of holes together, then break the material to grade, afterwards lifting it out with steam shovel, which will be a big time saver.

The Monroe Stone Co., of Monroe, Mich., shipped more than 4,000 cars of crushed stone in 1905. On account of the large number of orders on hand this plant will be compelled to operate all winter. This is the first time such has been necessary since its operation.

The Tiffin Crushed Stone Co., of Tiffin, Texas, has been organized with a capital stock of \$15,000.00. The incorporators are: John T. McElroy, of Midland, D. J. Rogers, of Barstow, and J. S. Love, of Pecos.

The Rockfish Ballast Co., of Rockfish, Va., has been incorporated with an authorized capital stock of \$75,000.00 to blast, quarry and crush stone.

Lime.

The National Lime Manufacturers' Association.

Meets Semi-Annually.

Peter Martin, Huntington, Ind. President
O. F. Perry, New York City First Vice President
W. B. Hill, Kansas City, Mo. Second Vice President
A. A. Stevens, Tyrone, Pa. Third Vice President
C. W. S. Cobb, St. Louis, Mo. Treasurer
B. H. Delebaugh, Louisville, Ky. Secretary

EXECUTIVE COMMITTEE:

Chas. Warner, Wilmington, Del.; O. W. Robertson, Milwaukee, Wis., and the President.

Official Organ, ROCK PRODUCTS.

A New Method of Burning Lime.

The Henry S. Spackman Engineering Co., of Philadelphia, Pa., have recently completed an installation for burning and handling lime at the plant of the New York Lime Co., Natural Bridge, N. Y., which is an innovation, and differs radically from the methods in use at the present time. In this installation the lime is burned in a rotary kiln similar to that used in burning cement, producer gas being used as fuel. During the whole process of burning the lime is under the direct control of the burner, thus assuring a uniformly high grade output.

The limestone is delivered to the kiln automatically and continuously, and proceeds through it in an opposite direction to the flame, thus gradually parting with its carbon dioxide; the continuous rotation of the kiln keeps the material in constant motion, thus assuring that each particle is uniformly exposed to the action of the heat and perfectly calcined. The discharge is uniform and constant and is conveyed automatically to the storage and packing bins. Wherever possible labor saving devices have been introduced so that the operation of the plant is automatic and continuous and the labor cost is reduced to a minimum.

The output of the kiln is four times that of any other kiln and the quality of the lime is of the highest grade. We are informed that the cost, per ton, of burned lime is lower than that produced by any other installation, thus being brought about by the saving in fuel and labor incident to this arrangement.

Limestone Deposit of Value.

A limestone deposit has been discovered near Ponca, Neb., just across the South Dakota line. A small quantity of the rock has been burned and the results are very gratifying. It is probable that some plan will be formulated for the establishment of a lime plant to develop this deposit.

May Develop Lime Rock Deposit.

DANBURY, CONN., January 12.—It is now believed that a company will soon be organized here to develop the deposit of limerock found here some time ago. The tests made were highly satisfactory and as there are large deposits of this rock a number of prominent parties are considering the matter of establishing a plant.

Purchase Lime Quarry—Will Enlarge Output.

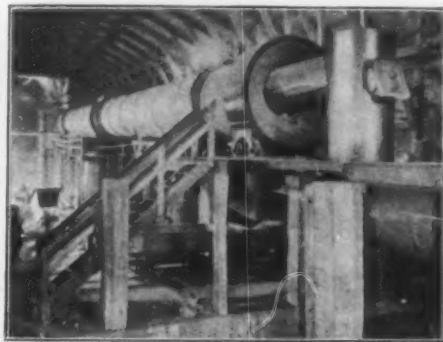
SALIDA, COL., January 4.—Edward E. Miller and Carl J. Brock, of Illinois, have purchased the Garfield lime quarry for \$30,000.00. The output of the quarry is six cars per day. New equipment will be installed, increasing this to twenty cars in the very near future. The plant has been in operation for several years supplying lime rock to the Salida smelters for fluxing purposes.

A New Hydrating Machine.

TOLEDO, OHIO, December 27.—J. H. Van Glahn, of this city, has completed his Perfection hydrating machine which is especially designed to meet the requirements of the steady growing demand for hydrated lime. Mr. Van Glahn has had six years of actual experience in the designing and construction of hydrating plants, and has devoted a great deal of time and labor in perfecting a hydrating machine, which by his experimental method of construction, removes the defects found in some other so called hydrating machines. The twelve reasons why this machine is a success will be furnished on application to any one contemplating building a perfect hydrating plant.

Big Demand for Lime Here.

OCALA, FLA., January 16.—J. M. Meffert, of the Ocala Lime Co., writes us: "About one year ago we built a new lime plant at Oak Hurst, near Ocala, two good, substantial brick kilns, of the best material that could be found. Arches and fire brick made by Evans & Howard, St. Louis, Mo., were used in their construction. We now have six kilns and every one of them has St. Louis block arches and lining of fire brick. Our kilns are without a doubt the finest and best in this State and giving perfect satisfaction. The demand for lime has been good the past year and is still increasing. The sand-lime brick people have standing orders with us for eight hundred barrels of lime a week. New plants are under construction, making the prospects better for larger business the coming year."



ROTARY KILN AT THE PLANT OF NEW YORK LIME CO.

"The output of our plant at Oak Hurst will be increased two hundred barrels per day, giving us in all a capacity of four hundred barrels a day. Rock is hoisted with a 3-h. p. gasoline engine, which will lessen our expense considerably. We manufactured over seventy thousand barrels of lime during 1905, and at times it has been a difficult matter to supply our customers."

A Good Year in Lime.

WILMINGTON, DEL., December 30.—The Charles Warner Co. write us: "The fall season in building lines in this district has been remarkable, both on account of the excellent weather for continuing building and on account of the natural activity existing in most industrial lines. The report of every machine and every kiln pushed to the utmost on December 30, is phenomenal and all conditions point towards a continuance of this activity during 1906. Our lime shipments have been averaging thirty carloads per day, from about the first of March of this year and the other building materials manufactured and sold by us, in proportion, so that we can express our most heartfelt thanks for what 1905 has done, with the hope of many more like it."

Look for a Good Season.

SHEFFIELD, MASS., January 22.—The Berkshire Hills Co. write us: "We have erected two new kilns for the purpose of burning lime, during the past year. We have had a very busy season past and look for the same in 1906. In the marble line we have erected a new four gang sawmill and expect to have it in operation soon. Business in that line is good, a little slower than in the summer. It gives us a chance to clean up about the plant and to get everything into good shape so there will be no hitch in operations when the busy season opens. We look forward with interest for the 'next' number of your paper, as we get lots of good out of it, in the way of finding out what the other fellow is doing. Will be glad to see your representative up here when he is in our vicinity."

Finds it Very Valuable.

In speaking of the value of Rock Products, J. McP. Scott, president of the Potomac Valley Stone and Lime Co., Hagerstown, Md., says: "Our company is not on your list of subscribers, but individually I have been taking your paper for a couple of years, and I can say that I find it of extreme interest and value in its general contents. The large volume of advertisements makes it additionally attractive and has supplied me with a great deal of valuable information."

New Lime Company Formed.

JOPLIN, Mo., December 29.—A new company has just been formed here for the manufacture of lime. The project has been headed by Henry Hess, an experienced lime manufacturer, who controls a secret process of burning lime, which, while not producing a very white lime, is said to be of a superior grade. The plant will be located near the Frisco tracks, on the Carl Junction, it is said, and the capacity will be quite large. About ten kilns will be operated.

Purchase Additional Property

GRANITE CITY, Mo., January 2.—Messrs. Kahl, Niemann & Elsenmyer, who own and operate the two lime and cement plants, known as the Granite City Lime and Cement Co., have just purchased five acres of land and a building for \$30,000.00, and will make a large number of improvements. The output will likely be very materially increased.

Will Erect Main Building.

CALEDONIA, N. Y., January 3.—The Caledonia Marl and Lime Co. will shortly begin the erection of their main building which was destroyed by fire last June. It will be 100 feet long by 75 feet wide and two stories high. The contract for this structure will soon be let.

May Increase Capacity.

ALTON, ILL., January 12.—The John Armstrong Lime and Quarry Co. say that there is nothing specially new. They have a plant of 750 tons per day of lime and 40 to 50 tons of crushed stone. They expect to add three more kilns in the spring and will push the business much more than it has ever been previously. Mr. Armstrong is an old experienced lime manufacturer, and has operated several plants.

Making Some Improvements.

DELAWARE, OHIO, January 13.—The Scioto Lime and Stone Co. say: "The call for lime at this season of the year is the best we have ever had. We are installing large steel bins for our hydrated lime, and have just completed a large building 30x75 feet for sacking and storage purposes of hydrate. Everything looks very encouraging for the coming season."

Still Doing a Little Business.

ASH GROVE, Mo., January 4.—The Ash Grove White Lime Association write us that they are always delighted with Rock Products. Continuing they say: "We are doing a little lime business, notwithstanding it is a little snowy out here."

RETSLAKE.

If your lump lime, or your hydrated lime "sets" too quick on the mortar board after having been "gauged," RETSLAKE will make it work COOL and SET SLOW.

RETSLAKE can be incorporated into your "white stuff" when the lump lime is run off, or it may be incorporated into hydrated lime during the hydrating process.

The cost of making your hot working lime work COOL is very slight.

The advantages of having a slow setting lime are many.

Contracts for a term of years will be made with lime manufacturers for the use of RETSLAKE.

Practical demonstrations of the efficiency of this process will be made before negotiations for its use are entered into.

Correspondence solicited.

RETSLAKE COMPANY.

P. O. Box 611.

PITTSBURG, PA.

THE ANNUAL MEETING.

Lime Manufacturers Get Together, Talk Shop and Cooperage.

IT WAS GOOD TO BE THERE.

The most successful meeting ever held by the National Lime Association was called to order at 10:30 on the morning of January 18 at the Great Northern Hotel, Chicago. President Warner was in the chair and, owing to the temporary absence of Secretary Defebaugh, ex-president Newton was elected temporary secretary. The roll was called and the following were found to be present. The room being so full it was necessary to have larger quarters the next day.

LIST OF ATTENDANCE.

DELAWARE—Charles Warner, Charles Warner Co., A. J. Shoemaker, D. S. Brewster, DuPont Powder Co., Wilmington.

ILLINOIS—A. Newton, A. T. Howe, C. E. Bishop, Marblehead Lime Co.; George H. Keyes, W. J. Austin, Aetna Powder Co.; John C. and A. J. O'Connell, Artesian Stone and Lime Works Co.; E. L. Cox, German-American Portland Cement Co.; W. A. Treat, Sprague Electric Co.; D. A. Slatery, J. R. Best, Ingersoll-Rand Drill Co.; B. L. McNulty, Rock Products, Chicago. C. M. Lauritzen, Raymond Bros. Impact Pulverizer Co.; C. Arthur Brown, A. T. Weaver, American Steel and Wire Co.; J. G. Sanborn, Chicago Pneumatic Tool Co.; F. B. Robinson, Chicago Lime Co.; S. O. Walker, Rand, McNally Co.; J. Gross, Chicago.

INDIANA—Peter Martin, A. L. Beck, Western Lime Co.; Huntington; H. D. Derwin, Horse Shoe Lime and Cement Co., Bedford; George L. Klee, Mitchell Lime Co., Mitchell.

IOWA—E. A. Fenger, Eagle Point Lime Works, Dubuque; A. A. Hurst, A. Hurst & Co., and Maquoketa Lime Co., Maquoketa; C. B. Robertson, Hardsocg Wonder Drill Co., Ottumwa.

KENTUCKY—A. L. Kanagy, Western Cement Co.; E. H. Defebaugh, Rock Products, Louisville.

MARYLAND—Charles H. Claiborne, Union Mining Co., Proprietors Mount Savage Fire Brick Works, Mount Savage; L. W. Barrick, L. W. Barrick & Sons, Woodboro.

MASSACHUSETTS—Robert S. Edwards, Boston.

MICHIGAN—W. E. Cabean, Wolverine Portland Cement Co., Coldwater; Morgan Curtis, Michigan Lime Co., Petoskey; G. J. Nicholson, White Marble Lime Co., Manistique.

MINNESOTA—C. A. Luster, Charles A. Kritzer, Clyde Iron Works, Duluth.

MISSOURI—C. W. S. Cobb, Glencoe Lime and Cement Co.; J. J. Helfer, P. M. Huckle, Ste. Genevieve Lime Co.; Phil J. Dauernhelm, Chas. W. Goetz Lime and Cement Co.; D. S. and F. H. Hunkins, Hunkins-Willis Lime and Cement Co., F. M. Bartrow, Colorado Lime and Cement Co., St. Louis; W. A. Raupp, Pierce City Lime Co., Pierce City; Charles A. Pfeiffer, Pfeiffer Stone Co., St. Joseph; W. B. Hill, Ash Grove White Lime Association, Kansas City; J. H. Burton, Ash Grove White Lime Association, Ash Grove; J. A. Matteson, Cape Lime and Marble Co., Cape Girardeau.

NEBRASKA—F. K. Mayne, Davis & Mayne, Blue Springs.

NEW YORK—O. F. Perry, Rockland-Rockport Lime Co.; W. B. Chapman, Morgan Construction Co.; C. J. Curtin, Farnam-Cheshire Lime Co.; Mr. Mangelndorf, Carlton Ellis, New York City; Peter Youcey, New York Lime Co., Carthage.

OHIO—James Reany, Jr., H. E. Kendrick, Scioto Lime and Stone Co., Delaware; W. H. Hill, Portsmouth-Harbeson-Walker Co., Portsmouth; Lawson Moores, Moores Lime Co.; C. A. Burgess, Ingersoll-Rand Drill Co., Cincinnati; J. J. Urschel, Woodville White Lime Co., and Urschel-Bates Valve Bag Co., Woodville; R. S. Thurston, Ohio Lime Co.; Geo. H. Irwin, Toledo Foundry and Machine Co., Toledo; Caleb Gowan, Kelly Island Lime and

Transport Co., Cleveland; Geo. B. Christian, J. F. Dombaugh, Norris-Christian Stone and Lime Co., Marion; W. E. Stockton, American Rolling Mill Co., Middletown; S. V. Peppel, Columbus; J. W. Urschel, Urschel Lime Co., Sugar Ridge; A. M. Bates, Urschel-Pates Valve Bag Co.; L. M. Reed, M. W. Blair, Atlas Car and Manufacturing Co., Cleveland; W. S. Sutcliffe, Seneca White Lime Co., Postoria; Wm. Zorn, Standard Lime Co., Gibsonburg.

PENNSYLVANIA—A. A. Stevens, J. King McLanahan, American Lime and Stone Co., Tyrone; Henry S. Spackman, E. W. Lazell, the Henry S. Spackman Engineering Co.; Charles C. Cox, Wm. Irvine, Knickerbocker Lime Co., Philadelphia; H. A. Gawthrop, Cedar Hollow Co., Norristown; A. H. Lamm, Standard Lime Co. of Ohio, W. H. Bradley, Duffs Patent Co., Pittsburg; S. W. Shoop, S. W.



PETER MARTIN, PRESIDENT, HUNTINGTON, IND.

Shoop & Co., Altoona; W. L. Helsey, High C Lime and Stone Co., Rheims; C. W. Rhodes, New Castle Portland Cement Co., New Castle; J. E. Baker, J. E. Baker Co., Columbia.

VERMONT—Joseph A. Peck, Middlebury.

VIRGINIA—Frank Crudden, Riverton Lime Co., W. E. Carson, Carson Lime Co., Riverton; John C. Paxton, Rockdale Lime Co., Toms Brook.

WASHINGTON—J. H. Evans, Idaho Lime Co., Spokane.

WEST VIRGINIA—John P. Martin, Harpers Ferry Lime Co., Millville.

WISCONSIN—R. C. Brown, Oshkosh; C. Ruedebusch, Jr., Mayville; Robertson Cook, Union Lime Co., O. W. Robertson, Milwaukee; Mr. Nast, Nast Bros., Marblehead.

President Warner, in his inimitable way, made a short address announcing the work of the Association as carried on by him during the year and expressing his desire for more personal co-operation of the membership of the Association to insure greater results from the work of the body. He spoke of the Executive Committee's endeavor

to secure the right man for the position of secretary or commissioner, being at the same time handicapped by the treasurer's balance, in going ahead and selecting a man and outlining the work for him to do. He urged all to participate in the program as a number of excellent papers were to be presented and suggested that they take advantage of the two days meeting together to better the interests of the lime manufacturer.

Treasurer C. W. S. Cobb made his report showing a balance on hand with considerable outstanding accounts, and the treasury in fairly good condition. The Association thanked Mr. Cobb by resolution for his report and on motion an auditing committee was appointed to audit the vouchers. The president appointed Mr. W. B. Hill, of Kansas City, and Mr. A. A. Stevens, of Tyrone, Pa., as the committee. President Warner then gave some detailed information about the Executive Committee's work which was for the benefit of the members only. It was suggested that they make some effort to find out the number of kilns represented, and the roll was called of the lime manufacturers represented to see as to the lime producing power of those present. It was shown evidently that over 30,000,000 bushels of lime were manufactured by the interests represented at this meeting.

On motion the President was authorized to appoint a nominating committee to report at the afternoon session. Messrs. Newton, Perry and Fleischer were appointed to nominate officers and directors for the ensuing year.

FIRE BRICK LININGS FOR LIME KILNS.

BY WM. E. CARSON.

The subject given me for discussion is one that does not seem to have had the consideration its seriousness would demand. The breaking down of a kiln and the expensive repairs necessary to its being put in shape for running again has been accepted as a matter of course, and the consequent irritating and costly loss of time has been treated with a patience, that can only be explained by a belief that such delay is inevitable. I believe, that if proper attention is turned to the manufacture of the brick used in lining, much of this trouble may be overcome, and this paper is offered with the hope that not only the attention of lime manufacturers will be turned in this direction, but that the fire brick manufacturers will take the subject up for their best and most careful consideration.

It is only recently (the time might be limited to the date of the organization of the National Lime Manufacturers' Association), that the requirements of the lime manufacturer have been regarded as of sufficient importance to draw the attention of either the scientist, inventor or the manufacturer who supplied the material used in the construction and repair of the lime plant. But, since the extent of the lime business has begun to be realized, we find scientists willing to devote their time to working out our problems and inventors daily offering us some new process by which we may hope to attain the end of the lime manufacturers' journey, a goal he seldom reaches, "getting rich quick." So that if we can point out our requirements, we may hope for relief and with this idea I am presenting this paper, hoping to lay a foundation upon which work of a definite nature may be done in the future.

Since no definite experimental work has been done with a view to ascertaining the requirements of the brick used in lime kiln lining, I am going to give a brief sketch of the composition and properties of the clay used in the manufacture of these brick, the process of manufacture, and my ideas of a proper kiln lining.

Kaolinite, the mineral which forms the base of all clays, is a product of the feldspar in decomposition. Next to quartz, feldspar is the most abundant mineral in the earth's crust, and it is widely distributed throughout the world, the most common varieties being:

Orthoclase (or potash feldspar), Albite (or soda spar) and Oligoclase (or soda-lime spar).

Feldspar is a silicate of alumina and alkali (potash, soda, lime or a combination of these) and when it is subjected to the weathering agencies of the atmosphere and water, the chemical union is broken up, resulting in the formation of a hydrous silicate of alumina, together with carbonate of potash and free silica. The reaction is as follows:

$K_2O \cdot Al_2O_3 \cdot 6SiO_2$ plus air plus $C \cdot O_2$ plus water plus organic acid, or Feldspar plus air plus carbonic acid gas plus water plus acid.

EQUALS

KCO₃ plus aLO₂, 2SiO₂, 2H₂O plus 4 SiO₂, carbonate of potash plus Kaolinite plus free silica.

The excess silica is set free either as quartz or as hydrous silica acid, and occurs as an impurity in the clay, unless removed by the sorting action of running water. The carbonate of potash is soluble in water and hence is leached out, leaving the hydrous silicate of alumina or kaolinite.

The chief impurities combined with kaolinite in the formation of the ordinary clays are quartz, undecomposed feldspar, mica, ferruginous minerals and lime compounds.

High grade fire clays, however, are almost pure kaolinite (usually 90 to 95 per cent.) with quartz as the chief impurity. Pure kaolinite consists of

Silica 46.3 per cent.
Alumina 39.8 per cent.
Combined water 13.9 per cent.

and the analysis of the best clays approach quite closely to this composition.

A typical analysis is:

(Si₂O₅) Silica 52.52 per cent.
(Al₂O₃) Alumina 31.84 per cent.
(Fe₂O₃) Oxide of Iron67 per cent.
(CaO) Lime50 per cent.
(MgO) Magnesia19 per cent.
(K₂O plus Na₂O) Alkalina59 per cent.
(Ti O₂) Oxide of Titanium. 1.68 per cent.
(H₂O) Combined water 11.68 per cent.

It is found that the most refractory clays are not plastic and must be mixed with a more plastic but less refractory clay in order that a bond may be formed that will produce a strong, durable brick. Herein lies a constant source of trouble, as the manufacturers dope up their pure clays with cull brick from around their yards, or raw clay, especially calcined for this purpose, which they regrind, this is known as "Grog" and is the cause of much carelessness in burning and a resultant low grade brick.

For the highest quality of brick, only enough plastic clay should be added to hold the mass together when burning; and addition of plastic clay in a large percentage makes a brick that will not stand a high temperature, but will stand the wear and tear, and these manufacturers call "Friction" or "Abrasion" brick.

Pure kaolinite hardens to a porcelain body at the melting point of platinum (which is 4593 degrees Fahrenheit or 2533 degrees Centigrade.) It resists fusion in all heats commercially employed except that of the electric arc.

It possesses the additional advantage of being chemically inactive even at these high temperatures, since the silica and alumina composing the kaolinite are in such a state of chemical combination that their union is not easily broken up.

These two qualities . . . (1) resistance to fusion of its own elements at high heat, and (2) resistance to chemical action between its ingredients and foreign elements, make kaolinite an ideal refractory material.

The degree to which it imparts these valuable qualities to the fire clay depends upon the nature and amount of the impurity present, the most harmful impurities being the following fluxes, lime, magnesia, iron, potash and soda.

So that it will be seen that an investigation of the quality of the clay out of which the brick is made becomes essential, if the lime manufacturer expects to get results from his kiln linings.

In the process of manufacture, the clay composed of a proper mixture of flint clay, and plastic bonding clay is ground in a dry pan, between stone or iron mullers and an iron base, then elevated and screened to a proper degree of fineness, the tailings returning to the dry pan to be re-ground. The screened clay passes through a chute to wet pans. Here the clay is mixed with "grog," which has previously been prepared, or the "grog" may, in some cases, be mixed with the original batch. In the wet pan the clay is ground and tempered until it is of the proper consistency to be worked, when it is removed and moulded by hand, hand moulded brick being superior to machine made. The brick are then put on a hot floor over concealed steam pipes and dried. When dry they are placed in kiln and burned under an intense heat, approaching closely the heat necessary to cause fusion of its ingredients.

Burning is the most important operation in the process of manufacture, but, because of the fact that fire-brick will stand great abuse in burning without apparent harm, and because the culls and waste can be used again, the burning is often done carelessly and incompetently.

From this it may be seen that it, therefore, behoves the lime manufacturer to purchase his brick only from the most careful and painstaking brick manufacturers, for as much depends on the lining of the kiln for his success, as on any other one item in his plant.

At the same time all the fault in the break down of kilns is not due to the quality of brick used; much can be attributed to the faulty construction in some part or parts of the kiln. Too great stress can not be laid on this point, for no matter how perfect the fire-brick may be, good results cannot be expected of them unless they are properly used. Very seldom, however, is this considered by lime men when they complain of the failure of their kiln linings; the remedy usually sought is to look up another brick manufacturer.

The four points in kiln construction most important to the life of the linings are:

- (1) Solid foundation for the kiln.
- (2) Use of correct shapes of brick to suit the work at hand.
- (3) Careful work in laying.
- (4) Proper backing up of the lining.

The first two points need no illumination, so need not be discussed.

The third point needs emphasis for even though everything else be favorable to the life of the brick, carelessness in laying will cause its failure in a very short time. All fire-brick should be laid in the best quality of fire-clay, using only enough clay to fill the voids left between the brick (and be well rubbed together).



WM. E. CARSON, RIVERTON, PA.

At all points where excessive heats are encountered the brick should be soaked thoroughly with water before being used, in order to prevent the dry brick absorbing the water from the fire-clay. This precaution renders possible the fitting of a much better and closer joint. Especially is this true of fire arches.

The question of backing up can be considered here only in a very brief way. The backing up must be strong enough and solid enough, so that no rupture in the joints can occur.

For backing, the use of 1½ courses or 13½ inches of common red brick of good quality is recommended for all points except for the lining of the fire box and the kiln lining for the first eight feet above the fire arches—here 2½ courses or 22½ inches should be used (at these points the old second hand fire-brick that are lying around the plant work splendidly).

This common brick in turn should be backed up in any suitable way, a good plan is to use extension ashes from a locomotive, or common clay, which makes a firm and at the same time elastic body, expanding and contracting as conditions require, while the steel jacket stone or bridge work hold all in a rigid position.

It is only when all the foregoing points are covered in the kiln construction that satisfaction can be expected and results demanded of the fire brick.

Having considered briefly the composition, properties, and method of manufacture of the fire-brick, we now prepare to take up the special use

of the brick in the lime kiln construction.

The qualities required of the brick to be used at different points in the lining make it seem advisable to divide them into four grades:

- (1) Vitrified block.
- (2) Friction brick.
- (3) Special lime kiln brick.
- (4) Highly refractory brick.

We will take up the properties of these different bricks, commencing with.

Vitrified Block.

At the extreme top of the kiln lining, the loading of the kiln produces an enormous frictional action, which can only be withstood by the toughest and strongest materials. Fortunately, however, very little heat is encountered at this point, and the fire-resisting quality of the material used need scarcely be considered, the only requirements necessary being great resistance to abrasion and resistance to the oxidizing and corroding action of the hot gases. A good quality of vitrified paving block, such as is used in ordinary street paving meets these requirements fully and gives complete satisfaction, and good tough vitrified brick will of course answer as well as the paving block. The distance this paving block lining extends down into the kiln must be determined by each kiln builder, to suit the needs of his particular case, the method used in loading the kiln determining this to large extent. Usually from five to ten feet will be found most advantageous with eight feet as an average figure, but no definite limit can be said to cover all cases.

The paving block would only be used in kilns operated without a stack. In kilns where stack is used the heat of the loading doors being too high for this type of brick.

Friction Brick.

Beginning at the point where the vitrified brick are discontinued, in the open kiln, or at the loading door in a kiln operated with a stack, and extending down a considerable distance into the kiln, and also beginning at the bottom of the fire-box and extending throughout the cooler are two sections of the lining where peculiar conditions must be met by the brick used, the conditions in the two places named, being similar and capable of being met by the same kind of brick.

The two chief qualities that must be possessed by this brick are:

- (1) Ability to stand the great frictional action produced by the descending masses of stone wearing upon the sides of the kiln.
- (2) Ability to withstand moderately high heats which are met at these points.

Although the heats encountered here are not excessive, yet they are sufficiently high to necessitate a consideration of refractoriness in selecting the kind of brick to be used.

These conditions are met satisfactorily by the brick now, produced by the various brick companies under the name of "Friction brick," "Abrasion brick," etc.

They are made by mixing a large percentage of plastic bonding clay with a highly refractory flint clay thus producing a strong close-grained brick, sufficiently refractory to stand most heats, and tough enough to endure a great amount of friction.

They are designed to meet conditions in blast furnaces practice, very similar to those met in the lime kiln at the sections mentioned.

These friction brick should be used throughout the lining of the cooler and also in the upper lining of the kiln from the point at which the vitrified paving blocks are discontinued down to a point about eight feet above the fire box.

Very little trouble will appear at these points if a good grade of friction brick be used and proper care be taken in laying the same.

Special Lime Kiln Brick.

From a point eight feet above the fire arches (the point where the use of the friction brick are terminated) down to the fire box is the most dangerous section in the kiln, that is, it is the place where failure generally starts. The failure occurs, thus; a little above the fire arch a slight eating away of the lining takes place. At first this is unnoticed, as it produces no apparent effect and it is not in a position that makes detection possible. But, little by little, it proceeds until the corner of the arch is bevelled off after which its progress is much more rapid. The failure of the inside lining soon follows, or the arch is so greatly weakened that it falls and the kiln is put out of commission for a period of ten days to two weeks.

Constructing the kiln with a slight batter at this point will prove beneficial (since the action is slightly frictional), but it will not wholly overcome the trouble above described.

To meet the requirements a special lime kiln brick should be made possessing the following four qualities:

- (1) It must have some abrasive qualities to resist the friction of the descending stone.
- (2) It must stand a high heat, the heat at which limestone is converted into lime.
- (3) It must withstand the chemical action of the hot lime, which tends toward the formation of the lime silicates of varying composition.
- (4) It must withstand the chemical action of hot coal gas.

A combination of the foregoing qualities in a single material is very hard to attain. Magnesia and chrome brick cannot be used because they fall in the fact that they offer only a slight resistance to abrasive action. The best material that can at present be suggested is a fire-clay as low in silica and as high in alumina as possible without passing the ratio at which this combination loses its refractory quality.

This lowering of the percentage of silica necessarily decreases the chance of chemical action taking place between the lime and the clay, since lime unites much more readily with silica than with alumina.

The clay must be finely ground and the brick hard burned, in order to overcome the tendency toward any chemical reaction between the brick and foreign material of any nature as it will be easily understood that such reaction cannot penetrate a close-grained dense body with the same ease that it does a loose open-grained material.

In addition, the brick should be tempered during manufacture with a view to producing as tough and resistant a structure as can possibly be developed in the clay used.

Briefly then the "Special Lime Kiln Brick" is made as follows:

- (1) The clay must be as high in alumina and as low in silica as possible without sacrificing refractoriness.
- (2) The clay must be finely ground.
- (3) The clay must be tempered to be as tough as possible.
- (4) The brick must be hard burned.

It is understood that a fire brick made as above described will necessarily lose some of its refractoriness, but, it is felt that this can be sacrificed to some extent, in order to develop the other properties enumerated.

These brick are to be used in the lining from the fire box up to a point eight feet above the same, at which point begin the "friction brick" heretofore considered.

Highly Refractory Brick.

In the fire arches, fire walls, and pillars supporting the arches, the best grade of refractory brick should be used.

These brick are made from pure flint clay, with only sufficient plastic bonding clay to give the required strength. Often failure of the lining begins in the arch, but as a rule this is not the fault of the inability of the fire-brick to withstand the normal temperature of the fire-box, but is due to the poor kiln construction or to the development of excessive heat in the furnace by temporarily obstructing the draught in some way, or to the constant lack of sufficient draught to pull the heated gases into the kiln. At times too much fine material is fed into the kiln thus filling the openings between the larger stones and choking the draught.

This causes the fire to lie dead in the fire-box which action soon melts down the arch.

If much trouble is encountered in the burning of the fire arches, the cause will be found either in a temporary impediment of the draught or in a natural deficiency in the same. In either case the difficulty should be remedied at once and sufficient draught be produced to move the hot gases rapidly from the furnace into the kiln even if artificial means must be resorted to.

Summarizing then—

Insist first on knowing what character of clay your fire-brick manufacturer has.

Second. On his methods of manufacture and burning.

Third. Insist that he give your necessities his particular attention.

Fourth. Correct the construction of your kiln if faulty.

Fifth. See personally that the proper shapes are put in the proper places.

Sixth. See personally that the brick-layer does his work correctly.

Seventh. That the brick manufacturer does not send you any brick he has on hand, "as good enough," demand the different grades of brick for the different heats and conditions.

Eighth. See that your kiln has a good draught, for in my opinion one of the greatest secrets of saving your kilns and making lime lies in the one word "DRAUGHT."

This paper brought out a great deal of discussion and evidenced its value by the active interest of every man in the room. On motion Mr. Carson was thanked most heartily for his effort for the benefit of the Association. On further motion the Association decided to print extra copies of this paper for distribution to the trade. The meeting then adjourned to 2:00 p. m.

AFTERNOON SESSION.

With President Warner in the chair Secretary Defebaugh said he regretted very much his inability to be on hand earlier and was very glad to see such a large attendance and hoped all would be profited by this meeting.

The President announced the exhibit of the Bates Valve Bag, stating where the delegates could see it.

The Nominating Committee then made their report for officers for the ensuing year as follows:

Peter Martin, Huntington, Ind., president; O. F. Perry, New York City, first vice president; W. B. Hill, Kansas City, Mo., second vice president; A. A. Stevens, Tyrone, Pa., third vice president; C. W. S. Cobb, St. Louis, Mo., treasurer; E. H. Defebaugh, Louisville, Ky., secretary.

Executive Committee: Charles Warner, Wilmington, Del.; O. W. Robertson, Milwaukee, Wis.; and the President.

Directors: A. Newton, Chicago, Ill.; W. E. Carson, Elverson, Va.; W. S. Sutliff, Fostoria, Ohio; George B. Christian, Marion, Ohio; R. C. Brown, Oshkosh, Wis.; F. C. Lauer, Rochester, N. Y.; Lawson Moores, Cincinnati, Ohio; F. P. Hunkins, St. Louis, Mo.; Homer Sly, Bay Shore, Mich.; John P. Rich, Swanton Junction, Vt.; F. O. Gulley, Fayetteville, Ark.; A. Courchesne, El Paso, Texas; Wallace Canfield, Canaan, Conn.; Walter Sheldon, Hamburg, N. J.; T. E. Fleischer, Sheboygan, Wis.

The next thing under consideration was the reading of the paper of Carlton Ellis, on the "Utilization of Spalls to Produce Quick Lime or Hydrate." Mr. Mangelsdorff, read the paper, which was received with much enthusiasm. Mr. Ellis eliminated technical examination of all features owing to lack of time, but talked of the reduction height of a kiln and the adoption of the induced draft, which was illustrated for the manufacturers to see, as well as demonstrated by drawing his regulation chamber for the lime charged from the top, the hopper from which his coal is fed to the gas fire and the air tight ash pit under the gas fire. The economizer as invented by Henry L. Doherty was also explained.

The general comments on this paper were such that any man could afford to join the Association in order to get the benefit of them. This will be printed in full in the minutes of the meeting for the benefit of the members of the Association.

After the President made some comments Mr. Spackman, of Philadelphia, explained the detail of the methods employed as illustrated by this paper and told what he had been able to do for the New York Lime Co., by means of a rotary kiln for burning lime. The effort was to eliminate the caustic from the lime and the result was about one bushel of coal to five of lime for burning on the basis of fifty tons a day. He illustrated that there had been no disintegration and that the lime had been burned thoroughly by the quick and hot process, the carbon being driven off the lime. Under this experiment, owing to the fact that different kinds of fuel had been used, the color was not as good in some cases, but the efficiency of the lime was demonstrated. He cited as an illustration of this color proposition, that a man complained severely on first receiving it, but after using it he would have no other. He showed economy in the labor of burning and that the power was generated from the waste gases, and that two rotaries would do the work of practically fourteen old kilns and the only objection to be raised was in the first cost of installation. The space occupied in the inauguration of this plant was very small, comparatively, even including the crushing plant. He also said that the

method insured reduction on the cost of the lining of the kilns and reduction of cost of fuel.

The comments and explanations will be given in full in the minutes of the meeting.

Mr. Sutliff remarked that owing to the fact of a crystal in the stone and fire cracks and choking on the old plan of kiln burning gas was objectionable, but I doubt not the rotary kiln will solve the problem. The automatic control of the kiln, however, may correct this, also the fact that gas as a fuel was not an experiment, but had been used in iron and in steel for years, and it also came out that fuel gas was of course cheaper at ten cents per thousand than the producer gas; therefore, the comments did not appeal so much to the man who had natural gas as to those who had not.

Col. A. H. Lauman said that his experience had been varied and while he had had his difficulties the results had proven satisfactory and others were present who testified to this also.

Mr. Wm. Irvine spoke of the difficulties he had had in the erection of a kiln to burn gas, but realized that the shoemaker element of the business would soon drop out and that the results of gas burned lime would be more satisfactory to all. The fact was he was practically satisfied on this point before leaving the meeting. One of his difficulties that came out in the discussion with another manufacturer, was the regular feeding of the kiln.

Mr. Parry spoke of the unfortunate experience of their using gas in Maine, but he believed there might be something good ahead of the lime manufacturer under the new methods. However, the subject most dear to him at this time, was how could better profits be made out of the lime business from the sales end?

The meeting went into executive session to discuss this subject in all its details.

On motion of Mr. Stevens the meeting thanked the gentlemen for their able papers and the information they had given on the manufacture of lime by gas, and Mr. W. B. Chapman, of the Morgan Construction Co., said he was very much interested in the discussion and told of their experience in the installation of producers which showed 30 per cent. gain over wood for fuel, and, as an illustration of the point, a manufacturer using a Morgan producer had, after experimenting with one producer, increased his order to three.

At this point in the proceedings President Warner introduced the newly elected president, Mr. Peter Martin. There is one thing about Mr. Martin, you never catch him asleep at the post, for when the rest of us were sleeping the night before, he gathered his ideas together and this is what he said.

ORGANIZATION.

BY PETER MARTIN.

There has been a great amount of talking done at the various meetings of this association and it seems to me that the time has fully come when we should obtain some tangible results. Words will pass away, but what is needed is action. Actions attract men and are an exemplification of strength and vigor. We may discuss principles and theories from now until the end of time, but unless we put these theories and principles into active practice, no results can be obtained.

Our association has been in existence about four or five years and what has been done? Of course, it has accomplished some good in the educational line, and we also have developed some social features, naturally derived from organizations of this character. These are well enough in their way, but it really has not accomplished the main object and the main questions have not yet been touched. It must not be forgotten that this organization should have been instrumental in causing local organizations to be formed. So far as this has not been done to that extent our meetings have failed. It is true that many educational matters have been brought up in our meetings and there has been an elimination of some of the hatred and jealousy that has generally existed among manufacturers, but the financial benefits which were to be derived from the organization have not been touched. We seem to have lost sight of this important feature altogether. What we need is a close financial union. If we were united as we should be and had the proper spirit of fairness with each other we could secure greater financial benefits, such as stability of prices, security of trade and permanently estab-

lished business. Now in order to do this we must be absolutely fair with each other. We must be liberal. I wish I could get you all to get rid of the blindness of selfishness. Could this be done the lime business would be made very profitable. If we could only look into the future and not live entirely in the present, there would be a great advance in our business in the lines of profits and prosperity.

There is no reason why the lime business should not be as profitable as any other business in the country. There is no over production; the supply can be accurately regulated; the output can be intelligently controlled; the demands are easily anticipated, and, were we to act wisely in the matter we could so regulate prices from time to time that good profits could be made and it is possible that we could see here and there a millionaire in the lime business, just as we find them in other lines of trade.

We must make special efforts to extend our organization so as to include all manufacturers in our territory. That which is endangering the organization is the attitude of the outside manufacturers who think they can slightly undersell us and in this way take our business from us. We should be able to show them that this is a mistaken policy. It may work for a short time and then those who are losing the business see where the difficulty lies. Then they take steps to protect themselves and their business with the result that trade becomes demoralized, prices become unstable, profits disappear, no one is benefited and the outside manufacturer loses money just the same as the other.

We must remember that similar thoughts float through the mind of one that we find in another. If one person is manipulating and formulating plans by which he can take an undue advantage of another, he may be sure that the other is doing the same thing with the result that both are losers. In consequence of this we all become on an equal footing with low prices, where by complete organization we would be on an equal footing with prices that would give us a profit and not loss. The only remedy is thorough and complete organization on liberal lines, not a union that will cut out the small manufacturers, but one that will help them and by so doing we help ourselves. The scriptures say, "The liberal soul shall be made fat," and if keep this principle in mind we need have no fear of the beneficial results of such a policy.

The fun of the whole proposition was he did not know he was President until after he had sprung his policy and, therefore, the 100 members of the Association will expect him to carry out this policy and they no doubt will put their shoulders to the wheel and follow this invincible leader.

The meeting in executive session considered many of the points brought out and the result of this talk will no doubt be followed out.

Mr. Martin was followed by Mr. Caleb Gowan, Mr. Stevens, Mr. Curtin, Mr. Cobb and several others who made talks, and discussed the possibility of the lime business and how it could be best fostered and built up on more profitable lines.

The meeting then adjourned to 10:00 a. m. on Friday.

FRIDAY MORNING.

The morning session was called to order about 10:30 by President Martin. He was flanked by Ex-presidents Newton and Warner and the lantern in the center of the room, Professor Gross, with his pleasant personality, interested all, so when he began to talk and illustrate his talk on the subject of "Advertising Methods" everybody was interested and sat up and took notice, for among the illustrations were several plants that were the apple of the eye of Ex-president Newton. Mr. J. Ellsworth Gross, being a photographer to advertisers, interested every one present.

Following this excellent talk, which will be printed and illustrated in the minutes of the meeting, a vote of thanks was extended to Mr. Gross for a pleasant and profitable half hour.

The report of the Auditing Committee was then read and approved.

Col. Sutliff, of Ohio, always full of something interesting to say, said, "It seems to me we ought to have a committee on the equalization of freights. In comparison with other products similar to lime lime gets the worst of it on freight classification and rates, almost 25 per cent. compared with soda ash and 17 per cent. on gypsum. Lime being a cheaper commodity than either of these there is every reason why it should be classed more

advantageously and the rate lowered. Mr. W. B. Hill, of Kansas City, concurred in the belief in the necessity and spoke of the competitive products having more dollars per car and still shipped on a lower minimum and lower classification and it is time for us to get more help from our railroad friends.

Col. Christian, of Ohio, spoke of his experience in discussing the matter with railroad freight men, but found little hope from that direction owing to the fact that it seems that railroad men have tabooed lime, as we get an old car, the smallest car, the high classification and the high rate when a freight man gives no reasons. The railroads certainly get all they possibly can out of lime and we ought to endeavor to secure more favorable conditions.

On motion of Mr. Hill, a committee of three was appointed by the President composed of Messrs. Newton, Christian and Sutliff, and at a later time in the proceedings, with the consent of the meeting, this committee was increased by adding Mr. Hill and Mr. Warner.

The next subject under consideration was a talk on "Advertising and Methods of Canvassing," by S. O. Walker, of the Rand-McNally Co., of Chicago. Mr. Walker made a neat little talk and told the gentlemen how to do it and incidentally showed them by application that a man's lime was always 99 1-3 per cent. pure carbonate of lime.

On motion of Mr. Heisey a vote of thanks was extended to Mr. Walker for his interesting talk.

In line with the continuous objection to 99 per cent. carbonate of lime Mr. Robertson moved that the vote of thanks be amended so that the 99 per cent. people would not think that they owned the earth.

The next subject before the meeting was "Lime in Filtration Process, and its Larger Possibilities of Future Development," by Mr. C. Arthur Brown, sanitary engineer of the American Steel and Wire Co., and this talk and illustrations were so full of meat that every man present was on edge to hear every word said and to note the illustrations. His demonstration of what caustic lime and sulphate of iron would do in a few minutes convinced all present that you could turn blood into water, or in other words, the Ohio from a stream of mud to a stream of pure spring water in a few minutes. With the large field of possibilities shown by Mr. Brown it was, as we put it in garden lore, just a scratching of the ground, and he urged the co-operation of the lime men with his company and assured them of the great increase in the use of lime for this purpose and went on further to say that in St. Louis more than 100,000,000 gallons were filtered in a small way with this process and 13,000 tons of lime a year alone was used for purification purposes and so far, as he could state authentically, about 75,000 tons of lime were used annually and we had only started. He commented on the best time for burning and the preparation of lime so it would serve the purpose best. This paper in full will be printed in the minutes of the meeting.

Mr. Brown urged all lime men to use their best brains and effort to specialize in the manufacture and sale of their products "And when you have new problems," he said, "by co-operation with myself we can work together for the good of all." There was some discussion as to the benefits of discussions of this character and Col. Christian said it was certainly a great benefit to come here and hear these papers and discuss the subject in question. In discussing the possibilities of pure lime he spoke of the excellent product when burned with wood. Mr. Christian further said that Clifford Owens, the youngest lime man in Ohio, was teaching the older men something in the way of working by-products of the lime kiln, and England was furnishing a suggestion, for English organizations had gone into the thing thoroughly and carbonic acid gas is being sold as a by-product and will be from our plants as well.

An investigation of the possibilities of our business will insure more profit and we are certainly indebted to Mr. Brown for his suggestions.

Mr. Beck and several others spoke of the production and the possibilities of the business and emphasized the fact that a large percentage of our product was going to waste owing to our laxity in working the by-products and incidentally not hydrating the waste material.

Mr. Reaney said by using coke he could get rid of the coal gas and burn the fuel into a permanent product.

Another manufacturer spoke of waste lime for a sand-lime brick product. The question of utiliz-

ing waste gases was then discussed and one or two manufacturers spoke of the troubles in taking advantage of them, owing to the necessity for strong packages and the investment of a large amount of money to cater to this soda water trade. It came out in this discussion that stale beer was used for the manufacture of carbonic acid gas at this time.

Dr. Lazell suggested lime for the purification of sewage and cited Oberlin, Ohio, as a town using this process, being filtered through sand, and he said sewage is of no value and is vile, but not so much so as the Ohio River water. He commented on the use of lime in the beet sugar industry and one smart Ohio man who had figured it out concluded that the magnesite lime would all be used for the manufacture of saltpeter. The discussion was very interesting and continued to the end of the session. After again thanking Mr. Brown for his excellent paper, the meeting adjourned to 2:00 p. m.

FRIDAY AFTERNOON SESSION.

The meeting went into executive session and discussed the question of how to promote business, which came up for consideration. A lively interest was taken in the matter.

The discussion of the promotion of the business brought out the possible increase of the business due to the use of lime in sand-lime brick, and Col. Reaney got his oar in in an intelligent way by saying that this subject boiled down means that we must give the American people what they want. If we will furnish them hydrated lime which will not deteriorate and keep right in line with the procession there will be no trouble about the lime being sold. If, in the past, lime had not been perishable it would carry the same price today as cement and other products. Now, by the adoption of hydration, we can gain this end and it is to be hoped we will take advantage of it.

There was considerable discussion as to the employment by the organization of a man to give all of his time to the work of the Association. A couple of thousand dollars was raised among the members of the Association without much difficulty and the President announced that this matter would be taken up with the membership of the Association.

On motion of Mr. Irvine the Association authorized an assessment of \$5.00 per kiln to pay the expenses of the organization in conducting its business on these lines. The motion was amended authorizing the President to raise \$2,500.00 as a guarantee to conduct the work of the Association in addition to the regular funds, and the Secretary authorized to notify the trade.

At this time the secretary was authorized to call the roll and find out the possibilities under this system at \$5.00 per kiln. An effort was made to promote the matter and the President was authorized to go ahead and carry it out.

Time was pressing and we had several good papers to hear yet. Mr. Robert S. Edwards, of Boston, made a talk on "Hydrated Lime and Lime Tests." It was full of meaty information and will be printed in full in the minutes of the meeting. The gentlemen present were very much pleased with the talk in question, although they had been together for seven or eight hours and a vote of thanks was extended to Mr. Edwards for his able paper.

The place of the next meeting was brought up and Cincinnati, Indianapolis, Denver and other cities were suggested. The matter is in the hands of the Executive Committee to be decided later on.

The next subject before the convention was the discussion of the appointment of an official chemist. Dr. Lazell made a few remarks on the subject and spoke of the position the Spackman Engineering Co., were in to help furnish information. After discussion the matter was put into the hands of the Executive Committee for their decision.

Col. C. A. Burgess, of Cincinnati, was called on to say what he knew about Cincinnati, and he gave us one of those characteristic talks of his and kept the house roaring and we were almost persuaded that Cincinnati was the only place this side of Heaven. He also spoke about the subject of quarrying machinery and his talk was happily received.

The meeting adjourned after the most successful session in the history of the business. The only way you can know all about it, however, is to become a member of the Association, for the minutes

will be printed in full, and we poor newspaper men are censored, so send in your \$25.00 check and you will know all about what was done and what will be done. There is a great deal in store for you if you will join with us.

Halsey, of Reems, said, "Well, we are about up to increased operations of lime in Pennsylvania." He spent the day following the convention in an automobile, seeing the sights of Chicago.

The youngest lime man present was D. S. Hunkins, mechanical engineer, and connected with his father's company, Hunkins-Willis Lime and Cement Co., St. Louis, Mo.

When a busy man like Caleb Gowan, of Cleveland, spends the time coming to our meetings, there must be something very interesting doing at each session.

Col. Christian, of Marion, Ohio, could not resist the temptation of throwing a few of his high class puns at Uncle Peter Martin. When the Colonel gets on his feet and begins to talk you know that the lawyer is present.

The hydrated specialist, Kritzer, of the Clyde Iron Works, was accompanied by President Luster. You know that means more orders.

The Missouri delegation was greater than ever. S. Vernon Peppel, who for several years has been connected with Rock Products, has launched his new chemical engineering laboratory at Columbus, Ohio, 1528 N. High Street. He was busy shaking hands with old friends and telling the trade of his business.

Col. L. A. Reed, of Cleveland, had a good set of lime barrel machinery in his vest pocket, ready to talk shop at any minute.

George S. Kice, of Mitchell, Ind., attended his first meeting, being a practical man in all departments of the business he felt very much at home among the manufacturers. He incidentally remarked that his ad. in Rock Products was selling lime right along, and the Mitchell brand always locks and acts like, before and after taking.

If Sprague and Burgess were hooped up together you would see holes in the ground quoted on stock exchange at \$1.25 and selling at \$1.35.

James Rainey, Jr., Delaware, Ohio, in speaking of Rock Products, said that 90 per cent of the results coming from their advertisements in connection with hydration of lime, comes from Rock Products.

Prosperity of the building trades in Iowa was represented by the smiling countenance of A. A. Hurst, of Maquoketa, Iowa. George H. Key, of the Aetna Powder Co., with his usual every day smile, was shaking hands with the lime men. Was telling them all about exploders.

THE BANQUET.

The annual dinner of the National Lime Association was held on Thursday evening in the ladies' dining room at the Great Northern Hotel. The members and visitors were all invited to participate and three hours were spent pleasantly in enjoying the excellent menu, and in social business chat.

President Martin was at the head of the table and was flanked by ex-President Warner on one side and ex-President Newton on the other. The other officers were grouped around him and the new president was a shining light. There were 87 people at the board and between courses some little talks were made. Ex-President Newton welcomed the gentlemen to Chicago, and Vice President Stevens, of Tyrone, Pa., responded and regretted that Mr. Newton, in giving us most all of the town, had overlooked giving us Lincoln Park. We presume, however, if a special petition was put in we could have that also.

Charles Cox, of Philadelphia, who was the third generation of a family who have been in the lime business for a hundred years, demonstrated that he was a speechmaker, and ex-President Warner told a joke on President Martin and expressed himself glad that the association was making such good progress and thought they should congratulate themselves in securing such good executive officers as President Martin.

W. B. Hill, of Kansas City, was asked to speak about being an expert salesman and was asked to tell some of the secrets of how he did it, but he was too bashful to give the secrets away.

Col. Cobb, the orator of the association, made a few timely remarks and President Martin set us all free by adjourning the meeting. It was a pleasant occasion without any frills and champagne corks popping and every one enjoyed the evening.

As this paper goes to press the Pennsylvania Lime Association and the Philadelphia Retail

Lime Dealers' Association are holding a joint banquet at Philadelphia, following the annual meetings of these bodies. They have done much locally for the manufacturer and dealer and these annual occasions are pleasant to remember.

NOTES OF THE MEETING.

The exhibit of the Sprague Electric Co. in charge of the Chicago manager, W. A. Treat, attracted considerable attention. The line shown was flexible, steam, air and water hose. The lime trade is not very well acquainted with this hose as it has been on the Western market but a few months. "The armour on our hose," said Mr. Treat, "is wound spirally, and in such a manner that it is flexible and can not kink. It has two wrappings of channelled steel with interlocking joints, and is protected on the outside from wearing the rubber and inside from expanding or contracting. The concave armour was used until recently, but we find the channel steel gives better service."

The Chicago Pneumatic Tool Co. had an exhibit in charge of G. P. Carnwright. The exhibit consisted of a large rock drill and several plug drills.

C. B. Robertson, representing the Hardsocg Wonder Drill Co., of Ottumwa, Iowa, was kept busy during the convention showing the drills and explaining the merits of the "wonder drills." Mr. Robertson exhibited two hand and three mounted drills, each of which is operated by compressed air. "Our drills have been on the market two years," said Mr. Robertson, "and we have had the greatest success. Our largest trade is in the West in the mining districts. Our foreign sales have shown up remarkably. A short time ago we shipped fifty drills to South Africa, and in other foreign countries we have placed large orders. A feature of our drill is that it blows a dry or air cleaned hole. One machine can do the work of eight men by the old methods, and it operates 2,500 blows per minute. We are now three weeks behind in our orders and the factory is working overtime."

The Urschel-Bates Bag Valve Co., of Woodville, Ohio, had one of their machines in operation across the street from the hotel. The exhibit was in charge of J. J. Urschel, Wm. Urschel and A. M. Bates. "We have had our machines on the market about three weeks," said Mr. J. J. Urschel, "and this is our first exhibit. We are highly pleased with the results and will say that we have done twice the business we anticipated. We have made contracts for installing eight machines, practically covering all the large hydrating lime plants in the country. Our demonstrations here the past few days showed we operated at the rate of eight bags per fifteen seconds. The machine showed it was capable of delivering a greater number providing the operators can take care of it, or in other words the machine is unlimited. Judging from the remarks of those who have seen our demonstrations, we have a very bright future."

E. A. Fengler, manager of the Eagle Point Lime Works, Dubuque, Iowa, said, "We are in the crushed stone business as well as manufacturers of lime. The shipping of crushed stone to contractors is almost impossible for us owing to the high freight rates. Being on the line of the C. M. and St. R. railway, we furnish them considerable stone. We employ about fifty men in our plant and have two kilns with an output of 250 barrels per day. Our quarry is 800 feet long and 210 feet high with practically no stripping. We contemplate the erection of a new warehouse nearer the railroad. The one we now have is unhandy, and we have too much hauling to do. The farmers in our part of the country had unusually good crops last year. We had a good business and look for a prosperous year in 1906."

J. J. Urschel, of the Woodville White Lime Co., said that the business had been fine in 1905 and he was very confident that 1906 would exceed that of 1905. They anticipate putting in a Clyde kicker in about two or three months which will have a capacity of 240 tons per day.

Chas. J. Kreitzer, of the Clyde Iron Works, Duluth, Minn., was on hand. He has a little army helping him sell hydrating machinery in the shape of customers who testify gladly about the profits. He recently had a severe spell of sickness, but the same cordial smile came with him—it fits.

Three new kilns will be erected by Col. Brown, of the Harpers Ferry Lime Co., of Millville, W. Va.

Capacity, 60,000 Per Day

ESTABLISHED 1841

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DEVOTE A SPECIAL DEPARTMENT to the manufacture of Brick particularly adapted both physically and chemically to Lime Kiln and Cement Kiln Construction. Large Stock Carried. Prompt Shipments Made. Write for quotations on Standard and Special Shapes, to

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Mount Savage, Md.

Cement.

Bugle Call of Progress.

The cement education that was disseminated at the two great National Cement Users' conventions during the first month of the year, has been received in a soil where it was greatly needed, and indeed it is appreciated. Most of this information was contributed by the cement manufacturers themselves, and indicates that they have begun to realize the great advantages of liberal education with regard to the composition and nature of cement itself in the matter of fostering new uses and a greater demand for the ever growing output. This is indeed as it should be, for no one is in such a favorable position to give out this information as the man who makes the cement. It is on the principle of an old Southern explanation, "Nobody but Aunt Hannah knows what's in the mince pie."

It is more than likely that quite a large percentage of the partial failures of concrete operations of every description in the hands of practical but not scientifically educated men is due to the lack of finished knowledge concerning the composition and action of cement, in various combinations and under different conditions.

The more intelligence we can give to the practical man who prepares the material for the final judgment of the public, the better for the industry, for it means more confidence on account of fewer failures, larger sales on account of a greater number and larger investments specifying cement, and the invention and application of further uses for it.

It was not many moons ago that the cement manufacturers were a unit upon the question that manufacturing cement is one business and using it is another, and there was a chorus to the effect that cement was like Caesar's wife, "above reproach and beyond question." We are willing to grant the former position with regard to a large number of the standard brands, but even with that we can not see that there ever should have been any objection to a closer acquaintance with the lady in order to understand her whims and fancies all the better.

Now that this point is recognized and the cement user has practically been adopted into the family as it were, we have a right to expect that in this year of grace, 1906, the percentage of increase in the demand will very largely exceed that of the record established in 1905. It is a good move, more light is good, all the light possible is better.

Regarding Belgian Cement.

The exportation of Belgian cement in 1904, according to Consul General Guenther, of Frankfurt, was 588,295 metric tons, the value of which was \$3,115,000.00. Of this amount Great Britain purchased 231,213 tons, Holland, Argentina, Brazil and Mexico following in the amounts purchased. He further states that it has been reported that the cement manufacturers of Holland and Germany have organized a syndicate for a period of nine years in order to regulate the production and prices of this commodity.

An Industry of Magnitude.

The manufacture of Portland cement is now carried on in seventeen different states of this country. Of these Pennsylvania leads, the approximate output being forty per cent of the total. This is estimated to be something over 12,000,000 barrels per year.

While this is true at the present time the cement industry is gaining in other sections of the

country in a remarkable way. In some sections of the West, namely, Kansas and a few other states, and also in the South, cement plants are multiplying rapidly. The Portland cement industry is one of large proportions, its uses covering a wide field. Still natural cement has not lost its popularity and usefulness, but on the contrary is steadily gaining. The only reason why it has lost some of its prestige is because of the general use of the word Portland, which has been used by those unfamiliar with cements, thus overshadowing it in a certain way.

The number of ingredients entering into the manufacture of cement to-day are many, among which may be mentioned the following: Limestone, marl, chalk, argillaceous limestone or cement rock, slag, shale and clay. These are mixed in varying proportions to obtain the desired result.

American Cement in Manila.

On account of the increasing use of cement in Manila, the demand is now quite large. Most of this cement comes from China, and it seems only reasonable that a large market for American made cements awaits the enterprising manufacturers who desire to extend their field of action.

The use of cement in reinforced structures is gaining continually and, if reports may be taken as trustworthy, the demand has just begun. The Philippines are a part of the United States, or under their guidance, to say the least, and the American manufacturers should have the bulk of this trade.

Cement for Western Contract.

Sealed proposals will be received at the office of the engineer, U. S. Reclamation Service, Montrose, Cal., until 2 o'clock p. m., February 6, for furnishing 30,000 barrels, more or less, of Portland cement, f. o. b. cars at stations on the Denver and Rio Grande railroad (narrow gauge) between Cedar Creek and Uncompagire, Cal. Particulars may be obtained by application to the Chief Engineer of the Reclamation Service, U. S. Geological Survey, Washington, D. C., or to the engineer, U. S. Reclamation Service, Montrose, Cal.

Believes There Will Be a Shortage.

Mr. E. L. Cox, general sales agent for the German-American Portland Cement Works, and United States sales agent for the Portland cement fabric Hemmoor, states that he believes by June 1 he will commence importing Hemmoor cement, and that he will import from 200,000 to 300,000 barrels this year. The conditions at present, he says, indicate that there will be, without doubt, a shortage of cement on the American market. In his opinion the American companies and works will be unable to supply the demand and it will result in a considerable quantity of the foreign production finding a market here. This will result in a tendency toward higher prices.

A Memorable Evening.

At the annual meeting of the salesmen of the Whitehall Portland Cement Co., at Philadelphia, on December 19, 20 and 21, the salesmen presented Sales Manager Green with a gold watch, appropriately engraved, and Traffic Manager Maloney with a solid gold fob and seal. The meeting was one never to be forgotten by those in attendance. President Righter gave the boys a banquet at the Union League club that was a "peach," to use the expression of one who had the good fortune to be on hand when the viands were spread out. It is sufficient to take his word for it, for we know that this company is one that does things.

The Owlcement Club, which was recently formed by the German American Cement Co., Chicago, Ill., is rapidly gaining in membership. Like the increasing popularity of Owlcement, this club bids fair to become one of the big things.

Cement Demand Good Here.

TORONTO, CANADA, January 13.—The cement industry is in a highly prosperous condition owing to the activity of the building trade and the increasing use of cement, and reinforced concrete in construction. The mild weather has enabled building to be carried on unusually late in the season, and the demand as soon as spring opens promises to be unprecedented. A notable feature of the market is that only the higher grades are wanted, there being little call for the inferior qualities. A great market for Ontario cement is being opened up in the West, where building is particularly active, owing to the influx of population. The International Portland Cement Co., of Hull, Que., has obtained orders for 50,000 barrels for spring delivery from that section. J. S. Irvin, managing director of the company, also has just returned from a trip to Winnipeg, states that owing to the heavy demands of the West they could easily find a profitable market for the entire output of their plant West of Lake Superior.

A smelting plant for the production of sulphuric and nitric acids and their by-products from the sulphur-yielding ores of the Marmora mining district, is to be erected by Canada Chemical Manufacturing Co., at Tweed, Hastings, Ont. Hitherto these acids have been manufactured from imported sulphur, but the larger demand for nitric acid as the basis of nitro-glycerine, consequent upon the growth of the mining industry and the extent of railroad building, presents an opportunity to develop the native supply. The plant will cost about \$1,000,000.00 and give employment to 100 men.

Will Make White Cement.

SYRACUSE, IND., January 23.—A new company, in which a number of Indianapolis men are interested, has just been organized, and on February 1 will begin the erection of a plant with a capacity of one thousand barrels daily, on the shore of Sparta lake, on the line of the B. and O. Railroad Co., in Noble County. M. M. Smith, for a number of years chemist of the Sandusky Portland Cement Co., of this city, is interested in the new concern. The new company will be known as the Art Portland Cement Co., and will make a white cement used chiefly for decorative purposes. The company has bought the marl deposits in Sparta, Eagle and Diamond lakes, all in the same vicinity.

When the supply in Sparta Lake—sufficient to keep the plant in operation for ten years—is exhausted, trolley lines will be constructed to bring the supply from the other lakes. The deposit in Eagle lake is sufficient to keep a one thousand-barrel plant in operation for at least thirty years. The white clay used in the manufacture of the cement will be obtained in either Park or Vermillion Counties.

Natural Cement in Demand.

UTICA, ILL., January 20.—The Illinois Hydraulic Cement Manufacturing Co., write us: "The trade in 1905 has been exceptionally brisk in our line and the prospects are that 1906 will be far ahead of last year. We are at the present time enlarging and remodeling our plant, thereby increasing our facilities for manufacture and shipping. The demand for natural cement is on the increase owing to its extensive use in the manufacture of hard wall plaster, and it is also supplanting lime, to a great extent, for brick laying, it being found to make a far better and stronger mortar than lime."

Organizing Big Cement Company.

MASON CITY, IOWA, January 15.—A large cement plant is now assured for this city. John A. Cruikshanks, of Bellefontaine, Ohio; E. J. Breen, of Fort Dodge, and others are interested in the project. The name of the organization will be the Iowa Portland Cement Co. The capital stock will be \$1,500,000.00. A plant costing \$1,200,000.00 will be erected. Of this amount \$42,000.00 will be subscribed and donated for a site by the citizens here. The capacity will be large and operations are to begin at an early date toward erecting the plant.

The Western Fire Cement Co., of Brazil, Ind., has been organized with a capital stock of \$1,000,000. The directors are: Lewis McNutt, B. S. McNutt and Charles McConnell.

Canadian Cement Industry.

The annual report of the Ontario Bureau of Mines for 1905, covering the operations of 1904, just published, gives some interesting details concerning the production of rock products in the Province, more especially with regard to the growing cement industry. Both natural rock cement and Portland cement are made in Ontario, and while the use of the former is decreasing, the manufacture of Portland cement has doubled in volume since 1901. In that year the output of Portland cement amounted 489,285 barrels, of the value of \$670,880.00. In 1904 it had increased to 965,871 barrels, of the value of \$1,305,221.00. In the same period the yield of natural rock cement had decreased from 138,628 barrels, value \$107,625.00, to 85,000 barrels, value \$65,250.00. The number of employees in the Portland cement industry in 1904 was 734 and the amount paid in wages \$323,689.00. The expansions of the industry was accompanied by a fall in the price from \$1.70 to \$1.40 per barrel.

A special paper on the cement industry in Ontario is contributed to the report by P. Gillespie, a leading expert, which comprises much practical and scientific information as well as full technical descriptions of the cement plants in operation or under construction, numbering fifteen. Most of these are situated in the western peninsula of Ontario, especially in the neighborhood of Owen Sound. While in the United States only some 16 per cent of the cement output is made from marl. The plants of the Ontario with only one exception, use marl as raw material for furnishing the lime required. This is found extensively at the bottom of Mallow lakes, and in Eastern Ontario especially in Renfrew, Lanark and Leeds Counties, are many large deposits which have not yet been exploited.

In estimating the possibilities of a marl bed the writer points out that out of 100 pounds of marl dredged only 18 pounds enters into the finished product. As a barrel of cement requires 220½ pounds of lime for its manufacture, 1,300 pounds of wet marl would furnish the required raw material, which at an outside estimate would be 52-100 of a cubic yard. A plant of a 300-barrel capacity would consume 156 cubic yards per day.

One hundred acres of a depth of 15 feet will contain 2,420,000 cubic yards of marl, or a sufficient supply at the assumed rate of consumption to last for fifty years. The silica and aluminum required are supplied by clay or shale, the silica needing to be in soluble form and not as granules of sand. The best clays for the purpose have a greasy unctious feeling. Those which impart a stain are unsuitable, as likely to be impregnated with iron or to contain organic matter—and those containing much calcium carbonate are also objectionable.

The cost of a cement plant of the most modern type is figured at \$50,000.00 for each rotary kiln, including first class buildings with power equipment and appliances for dredging marl and transporting materials, etc. Assuming that the output of each rotary is 100 barrels per day, this would represent an investment in plant of \$500.00 for each barrel of daily capacity. Experience, says Mr. Gillespie, has proved that in this industry the highest profits are realized by the plants having the greatest capacity, manufacture on a smaller scale having frequently proved unprofitable.

Owing to the growing use of concrete as a construction material in place of stone masonry it is anticipated that the output in the near future is certain to be largely increased.

Cement Rock in Nebraska.

TABLE ROCK, NEB., January 10.—Samples of cement rock taken from a deposit here have proven to be of a high order for the manufacture of cement. A number of capitalists have the matter under consideration and will likely establish a plant here. According to Prof. R. S. Hilton, of Washington, D. C., who has made an examination of the rock, the finest quality of cement can be manufactured from it.

The Iron City Portland Cement Co., of Pittsburg, Pa., has been organized with a capital stock of \$1,000,000.00. The company will quarry, mine and manufacture limestone and other minerals into cement, lime and other by-products. James L. De Long, A. F. Johnston, Chas. F. DeLong, all of Pittsburg, are the incorporators.

The Standard Cement Co., of Charlestown, Ind., is contemplating the manufacture of Portland cement. This company has heretofore manufactured only natural cement.

One of the Big Western Companies.

INDEPENDENCE, KAN., January 12.—The business of the Western States Portland Cement Co., in this city, is extending to all the states in this section of the country. This modern Portland cement plant has attracted considerable attention on account of its size and quality of its product. The buildings, located two miles from this city on the Missouri Pacific railroad, occupy a forty-acre tract, are all constructed of reinforced concrete. This company operates a chain of plants in several states, the local plants costing \$1,500,000.00, and conceded to be one of the finest of its kind in the world. The daily capacity is about 2,500 barrels, and employment is given to nearly 200 hands. An extensive deposit of clay and hundreds of acres of almost pure limestone formation, lying practically side by side, is located near the plant, from which is manufactured Portland cement of great durability, tensile strength and uniformity. The officers are: W. F. Cowham, of Jackson, Mich., president; C. E. Andrews, of Booneville, Mo., vice president; J. W. Shove, of Jackson, Mich., secretary; A. Steinmetz, assistant secretary; A. C. Stich, Independence, treasurer, and W. S. Potter, of Jackson, Mich., assistant treasurer.

Erecting Another Modern Plant.

IOLA, KAN., January 3.—The Kansas Portland Cement Co., of this city, is the first and only company organized wholly by Western capital, the company having been started in the spring of 1903, by well known capitalists and manufacturers of Western Missouri and Eastern Kansas, and it has proved to be one of the most successful in the country. The company, which now operates on a capital \$1,600,000.00 is building a second plant at Independence, Kan., by these gentlemen and their immediate friends, George E. Nicholson being president, A. B. Cockerell vice president, W. S. Goolin secretary, and L. L. Northup, treasurer. Night and day since the operation began in the spring of 1904 the local plant has been running to its full capacity, which last year was increased from 1,200 to 2,000 barrels daily. Even under these conditions it has only partly taken care of the demands. With a plant equipped with modern machinery of the latest and best type and 3,000 acres of the best cement rock, shale and clay known to the industry, this company is filling its contracts with a class of Portland cement equal to any manufactured. The Sunflower brand has become first choice in the specifications of many of the most noted contractors of the country, and as a result the 2,000-barrel plant in this city, with its force of about 300 men, is unable to meet the requirements.

The company has decided to build another factory at Independence, Kan., where their equipment and facilities will be equal, if not superior, to those here. On a tract of about 2,000 acres owned and leased, the company has at Independence a mound reaching 240 feet above the bed of Elk river, composed entirely of the very best linerock and shale—an outcropping of the Iola strata, known now the world over not to be excelled in cement making qualities.

The new plant will be completed next May, with a daily capacity of 3,000 barrels, and employ between 400 and 600 men. Through the medium of Leigh Hunt, the engineer who won distinction by erecting a number of cement plants, the company is combining in its Independence institution all the latest successful experience at the command of this industry. It is the intention to strictly maintain if not enhance the reputation of "Sunflower" cement, besides doubling the capacity of its output.

The International Armored Cement Co. has been incorporated at Dover, Del., with a capital stock of \$400,000.00. The company will manufacture, sell and deal in Portland cement and plasters, also manufacture cement blocks. The incorporators are all of Mexico.

The Crown Cement Works Co., of Trenton, N. J., has been organized to manufacture Portland and other cement, lime, plaster, etc. The capital stock is \$25,000.00. The incorporators are: H. H. McClure, George R. Work and E. Kern.

W. J. Prentice, president of the Castalia Portland Cement Co., of Pittsburg, Pa., has been visited by the stork, who had the goodness to leave a little son and heir, to brighten the household. As he arrived about the middle of December he came doubtless as a Christmas gift. It's good news to all of us.

The New England Adamant Securities Co., of Cambridgeport, Mass., has been organized with a capital stock of \$125,000.00. The company will deal in cement, etc. The officers are: President, Michael H. Sullivan, Dorchester, Mass., treasurer; Chas. King, Johnston, N. Y., clerk; C. S. Leighton, Cambridgeport, Mass.

The Cement Post and Pile Co., of Orangeburg, N. Y., has been organized to manufacture cement and composite posts, piles, etc. The capital stock is \$200,000.00, and the incorporators are: Warren B. Hutchinson, Wm. H. Camfield and Wm. H. Coe, all of New York City.

The new vice president of the Association of Cement Manufacturers, Mr. Chas. F. Wade, at Jonesville, Mich., is one of the most popular men in the business. He does not claim to be as large as Atlas or the Lehigh as a manufacturer, or make the only cement on earth, but it is without difficulty that he sells the full output of their Omega brand.

The Queens County Concrete Stone Co., of Richmond Hill, N. Y., has been organized to manufacture concrete. The capital stock is \$10,000.00. Harry H. Tillinghast, Martin Schmand and John T. Hangard are the incorporators.

The Philadelphia Concrete Co. has been organized with a capital stock of \$100,000.00 at Philadelphia, Pa. The company will manufacture concrete and erect buildings.

The Ajax Reinforced Concrete Co., of White Plains, N. Y., has been organized. Will do concrete work and building. The capital stock is \$25,000.00. Those interested are: Clair Foster, Douglaston, L. I.; G. Edward Escher, White Plains, N. Y.; Henry Escher, Jr., New York.

The Concrete-Steel Co., of New York, N. Y., has been organized to manufacture and deal in concrete, concrete-steel, etc. The capital stock is \$150,000.00. The incorporators are: T. E. Tomlinson, Wm. B. Nisbet, Henry Dunthorne, Lyndhurst, N. J.; Robbins Gilman and A. B. Halliday, Yonkers, N. Y.

The National Cement Co., of Horton, N. J., has been organized with a capital stock of \$100,000.00. The officers are: Dr. George S. Ridner, of Ironia, president, and W. W. Vanderbilt, of New York City, treasurer. The company will manufacture concrete blocks, concrete ties, posts, roofing tile, and other concrete commodities.

The Standard Concrete Stone Co., of New York City, has been incorporated with a capital stock of \$500,000.00. The directors are: W. J. Scoult, of Chicago; Guy Van Omninge, Edward N. Summer-ville, of New York.

The Mastenbrook Concrete Stone Co., of Wycoff, N. J., has been organized with a capital stock of \$10,000.00, and will engage in the manufacture of concrete, cement and building materials. William Mastenbrook, Wycoff, N. J., A. R. Allen and Ulamar Allen, both of Jersey City, are the incorporators.

The Winston-Salem Concrete Stone Co., of Winston-Salem, N. C., has been organized with a capital stock of \$25,000.00 to manufacture concrete blocks. J. J. Roddick and E. T. Ragland are the incorporators.

The Elmira Products Co., of Elmira, N. Y., has been organized to manufacture concrete blocks and other concrete articles. The officers are: Chas. A. Pulford, vice president; H. A. Fiske, secretary and treasurer.

The Cement Products Co., Burlington, Iowa, has been organized with a capital stock of \$7,500.00, for the manufacture of concrete blocks, sewer pipes and brick. W. G. Rasch, C. W. Diamer and George W. Waller are the incorporators.

The William E. Howe Co., 328 Market Street, Camden, N. J., has been organized to manufacture artificial stone, building materials, etc., with a capital stock of \$50,000.00. Curtis T. Baker, Herbert E. Harris and W. E. Zeller are the incorporators.

The Bronx Concrete Building Block Co. has been organized at New York City, for the manufacture of concrete blocks, brick, etc. The incorporators are: William E. Johnson, 422 West Twenty-third Street, and Frederick S. Schlesinger, of New York. Capital stock \$75,000.00.

The Caldwell Artificial Stone Co., of Caldwell, N. J., has been incorporated by John J. Van Order, Wm. Shears and Galen Booth.

Concrete

Iowa Concrete Association Convention.

The Iowa Association of Cement Users will hold its second annual meeting at Ames, February 8 and 9. The convention will be held in the new engineering hall at the Iowa State College. Ample space will be had for the exhibit feature, and several hundred delegates are expected to be present.

An interesting program has been arranged which will include papers on the following subjects: "Uses of Cement on the Farm for Posts, Foundations, etc."; "Sidewalk Construction"; "Cement Brick and Blocks"; "Waterproofing"; "Culverts"; "Ornamental Work"; "Proportioning and Mixing Cement"; "Cement Work in Freezing Weather"; "Cement Concrete Work"; "Engineering Specifications"; "Cement and Cement Products Testing."

Concrete Work in the Philippines.

Concrete work is finding favor in the Philippines. This is applicable in a particular way to Manila, which is rapidly adopting this form of construction, both in buildings and streets. Monolithic concrete, concrete blocks, cement plastered walls on expanded metal, are a few of the uses to which concrete is now being put in this far away country. Aside from these a large number of the streets in Manila are being improved with concrete gutters. These are twelve inches wide by six inches deep.

Considerable quantities of the cement used comes from Green Island, China, off the coast of Macao, though a small portion has been shipped from this country.

An Error in Judgment.

Mr. A. D. Mackay, the well known concrete machinery manufacturer, of Chicago, Ill., who has just returned from an extensive trip to Europe in speaking of the use of hollow concrete building blocks says that a few months ago an ordinance was railroaded through the Chicago city council forbidding the use of hollow concrete building blocks on any building over two stories in height. Commenting further on the subject he says he is surprised that an enlightened city like Chicago should be showing such evidences of progressing backwards; and that the parties in passing such an ordinance have made themselves ridiculous, and that some action should be taken to have the act amended immediately.

Massive Concrete Bridge Abutments.

SAN FRANCISCO, CAL., December 14.—An uplift bridge of the "Basco" type is now being constructed by a railroad company at San Francisco, Cal., which will soon be completed. This structure spans an arm of San Francisco Bay, along which a great many vessels pass to and fro. The width of the actual span is about 100 feet in the clear. At each end are the abutments, which, in their way, are of a very massive character. On these abutments rest the entire weight of the great structure. The abutments are composed entirely of concrete—not a single piece of natural stone being used in the building. At the level where the steel pieces of the bridge supports rest, the concrete foundation is 35 feet long, and five feet in width. The bottom is much wider and longer.

To secure a firm foundation upon which to place the first concrete, was a very difficult task. At that point the waters of the arm are quite deep, and the bottom is of a muddy and sandy nature. It was necessary to go down nearly 40 feet in order to reach sure footing. Immense caissons were sunk and the interior cleared of both earth and water. Then the concrete was placed in and gradually built up until the required height was reached. The concrete was strongly reinforced; besides, it was composed of finely crushed rock and fine, sharp sand—such as to give the material the greatest possible strength.

This is the first uplift bridge of the "Basco" type built on the Pacific Coast—railroad, or other.



NEW RESIDENCE JUST COMPLETED BY SID L. WILTSE, OF CEMENT MACHINERY CO., JACKSON, MICH. USING HIS OWN PRODUCTS EXCLUSIVELY.

wise. It is built of very massive structural steel—no wood being used. The flooring will also be of concrete. The only wood used at all will be the railroad ties. The total cost of this structure will be about \$100,000.00, and will be double tracked.

Concrete Machine Company Organized.

CLEVELAND, OHIO, January 18.—An organization has been formed here known as the Runyon Concrete Machinery Co. The capital stock of the organization is \$150,000.00. Those interested are: F. R. Marvin, A. J. Pearson and William D. McTigue, of Cleveland; Clay M. Runyon, of Elyria; and George W. Coleman. Mr. Runyon has invented a concrete machine, after three years spent in perfecting the same. It is the intention of the company to spend \$100,000.00 in a plant for the manufacture of these machines, and to establish factories in various parts of this country and Canada for the manufacture of concrete blocks of all kinds.

Artificial Granite in Germany.

There has quite recently been invented at Freiberg, Baden, Germany, a formula for the manufacture of artificial granite. It is the intention of the inventor, whom Consul Liefeld does not mention in speaking of the matter, to manufacture a cheap and durable material which has every appearance of natural granite, and which can be used for many, if not practically all, of the purposes to which this stone is now adapted.

In the manufacture of this new material both granite and marble chips are employed, which are mixed with a considerable portion of cement, water, coloring matter, and other ingredients, when desired, which forms a hard, consistent substance. The mixture is placed in moulds, where it remains until properly set, afterwards being removed in the form of blocks, which are immersed in water and allowed to absorb a certain amount of moisture. After this operation the blocks are removed and placed in a warm and shady place, where they attain the required dryness and hardness, afterwards being properly polished.



CONCRETE BRIDGE ABUTMENTS AT SAN FRANCISCO, CAL.

Invents Continuous Cement Machine.

A machine has been invented by J. W. Wilson, of Covington, Okla., for the manufacture of various designs of continuous concrete work. This includes foundation work, pipes, floors, sidewalks, etc. This machine will construct and lay in place in the ditch as much as forty rods of two-inch pipe per day. The cost will not be more than two or three cents per foot, according to quality and kind of cement mixture used. The cost of drain pipe would not exceed twenty-five cents per rod.

One of the particular features of this machine is that it is especially adapted for the manufacture of irrigation pipe. The pipes can be so arranged for irrigation purposes that it will require only one-fourth of the water that would be needed for surface irrigation, as the water will go direct to the roots of the plant where it is most needed. The machine moves away from the work, leaving a trail of the cement pipe behind it. The essential working parts of the machine are the piston for pressing the cement around the core within a mould of any desired size or shape. There is a neck for feeding the cement to the piston and a lever for working the piston and withdrawing the core, which moves the machine. Mr. Wilson has organized the National Continuous Concrete Machine Co., of which he is president, and will soon engage in the manufacture of the machine.

Unable to Supply the Demand.

HUTCHINSON, KAN., December 29.—The Hutchinson Cement Block Co., say: "We have found Rock Products a great help to us, and are much pleased with it. We are operating a set of E. W. Seaman's machines, and have built up a nice business. We could not supply the demand this year."

The Pensacola Cement Stone Co., of Pensacola, Fla., has been organized to manufacture concrete blocks.

L. L. Atwood, of Kingston, N. Y., will establish a plant for the manufacture of concrete blocks, sills, window caps, etc.

The Continental Concrete Co., of Pittsburg, Pa., has been organized with a capital stock of \$50,000.00. The directors are: R. H. Haas, H. P. Haas, and S. F. Winana.

The Jackson Art Stone Co., of Jackson, Tenn., has been organized with a capital stock of \$10,000.00. The incorporators are: John Mosal, T. J. Ott and others.

The Florida Concrete Manufacturing Co., of Jacksonville, Fla., has been organized with a capital stock of \$10,000.00. Operations will begin within a short time.

The Detroit Concrete Co. has been organized at Detroit, Mich., to manufacture concrete blocks. The capital stock is \$100,000.00. Those interested are: Hugh Wallace, Daniel D. Wessels, Fred H. Zeigen.

The Clyde Artificial Stone Co., of Clyde, Ohio, has been organized with a capital stock of \$10,000.00. J. F. Hiner, J. W. Welner, R. W. Hiner, B. S. Graves and Frank Keise are the incorporators.

The Hudson Valley Concrete Building Co., of Altamont, Albany County, N. Y., has been organized by E. W. Richardson, W. W. Brown, Albany, and C. J. Finkle, Rensselaer, N. Y. The capital stock is \$15,000.00.

The Thompson Cement Stone Co., Gowanda, N. Y., has been organized with a capital stock of \$5,000.00. The company will manufacture concrete brick, block and do concrete work. Everett J. Thompson, David Nagle and Oliver B. Van Deusen are the incorporators.

The Concrete Construction Co., of Birmingham, Ala., has been organized with a capital stock of \$2,000.00, and the Cement Block Manufacturing Co., of the same city, has been incorporated with a capital of \$20,000.00. W. G. Oliver, Robert Jemison, Jr., and A. R. Wilkerson are the incorporators of both concerns.

The Waterproofing Co., of New York, N. Y., has been organized with a capital stock of \$50,000.00. The company will manufacture mortar, cement and waterproofing materials. Franklin Remington, Greenwich, Conn.; Edwin S. Jarrett, New York; Daniel E. Moran, Mendham, N. J.; Edwin F. Kellogg, New York; Frederick S. Greene, Port Washington, N. Y., are the incorporators.

AT MILWAUKEE.

(Continued from page 3.)

which often may be effected and the improvement in quality which almost always will result by a careful selection and proportioning of the aggregates.

In many cases, especially where the cost of Portland cement is low, it may be cheaper to use whatever materials are nearest at hand, and insure the quality of the concrete or mortar by making it excessively rich in cement. If the structure is small and of little importance, this course is properly followed, but, on the other hand, if a large amount of concrete is to be laid, and especially if the process is to be carried on in a factory—as in concrete block manufacture—it pays from the standpoints of both quality and economy to use great care in the selection of the aggregates as well as of the cement, and to provide means for maintaining uniformity.

To illustrate the variation which different aggregates may produce even when they are mixed with cement in the same proportions, the author has selected a few comparative tests of mortar and concrete.

Effect of Different Aggregates Upon the Strength of Mortar and Concrete.

Tests by Mr. Rene Feret* (pronounced Feray), of France with mortar made from different natural sands, show a surprising variation in strength, which is evidently due simply to the fineness of the sand of which the different specimens are composed. Selecting from his results proportions 1:2.5 by weight—that is, one part cement to 2½ parts sand—and converting his results, at the age of five months, from French units to pounds per square inch, the average tensile strength of Portland cement mortar made with coarse sand is 421 pounds per square inch, with medium sand 368 pounds per square inch, and with fine sand 302 pounds per square inch. In the crushing strength, usually the most important consideration, the difference is even more marked. In round numbers, at the age of five months, the mortar of coarse sand gave 5,200 pounds per square inch, the medium sand 3,400 pounds per square inch, and the fine sand 1,900 pounds per square inch. Note that the different sands were not artificially prepared, but were taken from the natural bank, and correspond to those which every day are being used for concrete and mortar.

The effect of different mixtures of the same kind of material is shown by tests with which the author has been connected during the past year, but the results of which have not yet been published. By varying the sizes of the particles of the aggregates, but using in all cases stone from the same ledge and the same proportion of cement to total aggregate by weight, namely 1:9 (or approximately 1:3:6), he found it possible to make specimens the resulting strengths of some of which were 2½ times the strengths of others.

The effect of the hardness of strength of the stone used for the coarse aggregate is shown in tests of George W. Rafter** which, for proportions about 1:2:6.5, gave 50 per cent greater compressive strength of concrete where the coarse aggregate was a hard sandstone than, with similar proportions, where a shale was substituted. In some of his tests the harder stone gave a concrete even double the strength of the concrete with the softer stone.

General Principles for Selecting Stone.

The quality of concrete is affected by the hardness of the stone; the shape of the particles; the maximum size of the particles; and the relative sizes of the particles.

If broken stone is used, and there is an opportunity for choice, the best is that which is hard; with cubical fracture; with particles whose maximum size is as large as can be handled in the work; with the particles smaller than, say, ¼ inch screened out (to be used as sand); and with the sizes of the remaining coarse stone varying from small to large, the coarsest predominating.

If gravel is used, it must be clean; the maximum size of particles should be as large as can be handled in the work; grains below, say, ¼ inch should be screened out (to be used as sand); and the size of the stones should vary, with the coarsest predominating.

I have said that the size of the coarsest particles of stone should be as large as can be handled in the work. This is because the strength of the concrete is thereby increased, and a leaner mix-

ture can be used than with small stone. In mass concrete, the stones, if too large, are liable to separate from the mortar, unless placed by hand or derrick as in rubble concrete, and a practical maximum size is 2½ or 3 inches. In thin walls, floors and other reinforced construction, a 1 inch maximum size is generally as large as can be easily worked between the steel. In some cases where the walls are very thin, say, 3 or 4 inches, a ¾ inch maximum size is more convenient to handle.

It is a little more trouble, but almost always best, to screen out the sand from gravel, or the fine material from crusher stone, and then remix it in the proportions required by the specifications, for, otherwise, the proportions will vary at different points, and one must use and pay for, an excess of cement to balance the lack of uniformity.

If gravel is used, it is absolutely essential that it shall be clean, because if clay or loam adheres to the particles, the adhesion of the cement will be destroyed or weakened. Tests of the Boston Transit Commission*** give an average unit transverse strength of 606 pounds per square inch for concrete made with clean gravel as against 446 pounds per square inch when made with dirty gravel.

Comparative Values of Different Stones.

Different stones of the same class vary so widely in texture and strength that it is impossible to give their exact comparative values for concrete.



RICHARD L. HUMPHREY,
RE-ELECTED PRESIDENT NATIONAL ASSOCIATION OF
CEMENT USERS.

A comparison by the author of a large number of tests of concrete made with different kinds of stone, indicate that the value of a broken stone for concrete is largely governed by the actual strength of the stone itself, the hardest stone producing the strongest concrete. This forms a valuable guide for comparing different stones. Comparative tests indicate that the different stones in order of their value for concrete are approximately as follows: (1) Trap; (2) Granite; (3) Gravel; (4) Marble; (5) Limestone; (6) Slag; (7) Sandstone; (8) Slate; (9) Shale; (10) Cinders.

Although, as stated above, the wide difference in the quality of the stone of any class make accurate comparisons impossible—and this difficulty is increased by the fact that the proportions and age of the specimens affect their relative value—an approximate estimate drawn from actual tests, gives the value for concrete of good quality sandstone as not more than ¾ of the value of trap, and the value of slate as less than half that of trap. Good cinders nearly equal slate and shale in the strength of concrete made with them.

The hardness of the stone grows in importance with the age of the concrete. This gravel concrete, because of the rounded surfaces, at the age of one month, may be weaker than a concrete made with comparatively soft broken stone, but at the age of one year it may surpass in strength the

*Taylor and Thompson's "Concrete, Plain and Reinforced," 1905, p. 136.

**Second Report on Genesee River Storage Project, 1894.

***Seventh Report of Boston Transit Commission, 1901, p. 39.

broken stone concrete because, as the cement becomes hard, there is greater tendency for the stones themselves to shear through, and the hardness of the gravel stones thus come into play. Gravel makes a dense mixture, and if much cheaper than broken stone, can usually be substituted for it.

A flat grained material packs less closely and generally is inferior to stone of cubical fracture.

General Principles for Selecting Sand.

The only characteristics of sand which need be considered are the coarseness and relative coarseness of its grains and its cleanness. These qualities affect the density of the mortar produced; and therefore the test of the volume of mortar, or "yield," determines which of two or more sands is best graded. The "yield" or "volumetric" test I consider of greater value for quick results than all others put together.

The methods of employing it are described farther along in the paper.

The best sand is that which produces the smallest volume of plastic mortar when mixed with cement in the required proportions by weight.

A high weight of sand and a corresponding low per cent of voids are indications of coarseness and good grading of particles; but because of the impossibility of establishing uniformity in weighing or measuring, they are merely general guides which can not under any conditions be taken as positive indications of true relative values. The various characteristics of sand are separately considered in the following paragraphs:

Weight of Sand.—A heavy sand is generally denser, and therefore better than a light sand. However, this is not a positive sign of worth, because the difference in moisture may effect the weight by 20 per cent, and when weighed dry the results are not comparable for mortars, since a fine sand takes more water than coarse.

As an illustration of the variation in weight of natural sands having different moisture, the author found that the weight per cubic foot of Cowe Bay sand, which, dry, averaged 103 pounds, when placed out of doors, and weighed after a rain in exactly the same way (although it was allowed to drain for two days) averaged 83 pounds.

Voids in Sand.—The voids, like the weight, are so variable in the same sand, because of different percentages of moisture and different methods of handling, that their determination is of but slight value. In the Cowe Bay sand just mentioned the voids were 38 per cent in the sand, dry, and 52 per cent in the same sand, moist.

Because of such discrepancies the author prefers to mix the sand with the cement and water, and determine the voids in the fresh mortar, as described later. This gives a true comparison of different sands, since with the same percentage of cement, the mortar having the lowest air plus water voids, is the strongest.

Coarseness of Sand.—A coarse sand produces the densest, and therefore, the strongest mortar or concrete. A sufficient quantity of fine grains is valuable to grade down and reduce the size of the voids, but in ordinary natural material, either sand or screenings, there will be found sufficient fine material for ordinary proportions, such as 1:1, 1:2, or 1:2½. For leaner proportions, such as 1:4 or 1:5, and sometimes 1:8, an addition of fine particles will be found advantageous to assist the cement in filling the voids. A dirty sand, that is, one containing fine clay or other mineral matter, up to, say, 10 per cent, is actually found by tests, to be better than clean sand for lean mortars.

For water-tight work it is probable that a larger proportion of very fine grains may be employed than for the best results in strength. This is a question, however, which has not yet been thoroughly investigated.

Foret's rule for sand to produce the densest mortar, is to proportion the coarse grains as double the fine, including the cement, with no grains of intermediate size. There is difficulty in an exact practical application of this rule, but it indicates the trend to be followed in seeking maximum density and strength.

Cleanness of Sand.—An excess of fine material or dirt, as has just been noted, weakens a mortar which is rich in cement. It may also seriously retard its setting. My attention was recently called to a concrete lining, one portion of which failed to set hard for several weeks, although the same cement was used as on adjacent portions of the work. The difficulty proved to be due entirely to the fact that the contractor substituted, in this place, a very fine sand, the regular material happening to run low.

Sharpness of Sand.—Notice that the quality of sharpness has not been mentioned among the essential characteristics of sand. This omission was intentional. The majority of specifications still call for "sharp" sand, and yet I have never known—and I venture to predict that none of those present have ever known—a sand to be rejected simply because of its lack of sharpness. As a matter of fact, if two sands have the same sized grains, and contain an equal amount of dust, the one with rounded grains is apt to give a denser and stronger mortar than the sharp grained sand. A sand with a sharp "feel" is preferable to another, not to any extent because of its sharpness, but because the grittiness indicates a silicious sand which is apt to have no excess of fine material.

Sand vs. Broken Stone Screenings.—Many comparative tests of sand and screenings have been made with contrary results. While frequently crusher screenings produce stronger mortar than ordinary sand, the author in an extensive series of tests has found the reverse to be true. This disagreement is probably due to the grading of the particles, although in certain cases the screenings may add to the strength because of hydraulicity of the dust when mixed with cement.

Testing Sand.

In the previous paragraphs are shown the defects in the more common methods of examining sand.

I now venture to propose a test for sand which I am using constantly in my experiments for clients. Tests which I made in 1903 proved to me the value of the principles of density of mortars laid down by Feret, and in the winter of that year similar plans for testing aggregates were introduced by Mr. William B. Fuller and myself at Jerome Park Reservoir, New York City. The object of the test is to determine which of two or more sands will produce the denser, and therefore, the stronger mortar, in any given proportions. From the results of tests, the relative strengths of two different mortars can be approximately estimated without resorting to actual tensile or compressive tests.

In opening this paper I have given the different results in strength which Mr. Feret found with coarse, medium and fine sands respectively, these relative strengths in compression being respectively, 5,200, 3,400 and 1,900 pounds, with proportions 1:2½ by weight in each case. An examination of the tests shows that the strongest mortar was also densest, that is, the smallest volume, or yield, of mortar was produced with a given weight of aggregate.

The mortar with medium sand occupied a volume 7½ per cent in excess of the volume of the mortar with coarse sand; and the mortar of fine sand, a volume 17 per cent in excess of the mortar with coarse sand.

Following these principles, two sands may be compared and the better one selected by determining which produces the smallest volume of mortar with the given proportion by weight.

Using the method described below, the author has been able to increase the strength of a mortar about 40 per cent by merely changing the sizes of grains of the aggregate.

The method of making the test is as follows:

If the proportions of the cement to sand are by volume, they must be reduced to weight proportions; for example, if a sand weighs 83 pounds per cubic foot moist, and the moisture found by drying a small sample of it at 212 degrees Fahr. is 4 per cent, which corresponds to about 3 pounds in the cubic foot, the weight of dry sand in the cubic foot will be 83 less 3 equals 80. If the proportions by volume are 1:3, that is, one cubic foot dry cement to 3 cubic feet of moist sand, and if we assume the weight of the cement as 100 pounds per cubic foot, the proportions by weight will be 100 pounds cement to 3x80 equals 240 pounds sand, which corresponds to proportions 1:2.4 by weight.

A convenient measure for the mortar is a glass graduate, about 1½ inches diameter, graduated to 250 cubic centimeters. A convenient weight of cement plus sand, for a test, is 350 grains. For weighing, I employ Harvard Trip scales, which weigh with fair accuracy to one-tenth of a gram. The sand is dried and mixed with cement, in the calculated proportions, in a shallow pan about 10 inches diameter and 1 inch deep. The mixing is conveniently done with a 4-inch pointing trowel. The dry mixed material is formed into a circle, as in mixing cement for briquettes and sufficient water added to make a mortar of plastic consistency, similar to that used in laying brick masonry. After mixing five minutes, the mortar is introduced

about 20 c. c. at a time into the graduate, and, to expel any air bubbles, is lightly tamped with a round stick with a flat end.

The mortar is allowed to settle in the graduate for one or two hours until the level becomes constant, when the surplus water is poured off, and the volume of the mortar in cubic centimeters is read. For greater exactness a correction may be introduced for mortar remaining on pan and trowel. The other sands, which are to be compared with this one, are then mixed with cement in the same proportions by dry weight, and sufficient water added to give the same consistency. The percentage of water required will vary with the different aggregates, the finer sand requiring the more water. After testing all the mortars, the sand which produces the strongest mortar is immediately located as that in the mortar of lowest volume. By systematic trials, the best mixture of two or more sands may also be found.

In many cases a correction must be introduced for the specific gravity of the sand; for example, ordinary bank sand has an average specific gravity of 2.65, but if this is to be compared with broken stone screenings having a specific gravity of, say, 2.80, the proportions of the two must be made slightly different. For these particular specific gravities, proportions 1:3, by weight, with sand, corresponds in absolute volume to proportions 1:3.2, by weight, of the screenings.

In making these tests, it is also important to notice the character of the mortar as it is being mixed. It should work smooth under the trowel and be practically free from air bubbles.

Calculating Relative Strength of Sand.

From the results of the tests described, it is possible to very closely estimate the relative strength of different mortars made with the same cement. A formula is given by M. Feret for calculating the strength from the absolute volumes of the ingredients of the mortar, but wishing to avoid the calculation of the absolute volumes and obtain the result directly from the weights of the materials and the volume of the mortar made from them I have found it possible to evolve from Feret's formula one which makes use only of the data from the tests in the graduates above described.

The formula is as follows:

Let—

P equal compressive strength of mortar in pounds per square inch.

K equal a constant.

Q equal measured volume or quantity of mortar in cubic centimeters.

C equal weight of cement used in grams.

S equal weight of sand used in grams.

gc equal specific gravity of cement.

gs equal specific gravity of sand.

Then—

$$P = K \frac{(gs)^2}{(gc)} \frac{(C)}{(gsQ - S)}$$

P equal K (gs)² divided by (gc); (C)² divided by (gcQ - S).

This formula may be readily altered to apply to the English system of weights and measures.

The value of K varies with different cements and different ages of the same mortar, hence, it is simplest to disregard the actual strength, and consider the relative strengths of any two or more mortars as in direct proportion to the values of the square of the quantities in brackets.

If the aggregates to be compared have similar specific gravity as is the case with different natural sands, the relative strengths of the mortars will be in proportion to the values of

$$\frac{(C)^2}{gsQ - S}$$

To illustrate the practical value of the formula, aside from theory, it may be of interest to refer to a recent series of comparative tests made in my own laboratory. A mixture of sand and cement in proportions 70 grams cement to 276 grams sand produced in the graduate a volume of mortar of 178 c. c. After making a number of trial tests, using in every case the same proportions by weight a new mixture of sizes of the same aggregate was obtained, whose volume when mixed with the ce-

ment and water was 165 c. c. The specific gravity of the sand, which in this instance was crushed rock, in both cases was 2.85. Substituting these values in the formula, we find the ratio of the two tests to be 1 to 1.40; that is, the mortar having the smallest volume ought to be 1.40 times (or 40 per cent) stronger than the other. Actual tests of the two mortars, afterwards made in similar proportions into long prisms, gave at the end of 14 days an average of 832 pounds per square inch for one and 1,153 pounds per square inch for the other, thus showing an actual excess of strength of 39 per cent, which is substantially identical with the estimated increase.

Testing Concrete Aggregates.

For concrete in any given proportions, the best sizes of stone and of sand may be determined by similar methods to those described for testing sand mortars, although larger quantities of materials must be used and the measure must be strong to withstand the light ramming which is necessary.

A short length of cast iron pipe, closed at one end, may be used for this.

The aggregates which mixed with cement in the required proportions produce the smallest volume of concrete, are usually the best, although, as already indicated, the shape of the particles and their hardness must also be taken into consideration.

Proportioning Concrete.

Lack of time forbids the description of the application of these methods to determining the relative proportions of two or more aggregates in a concrete. Here again we have the two general principal that the weight of material and the percentage of cement remaining the same, the mixture producing the smallest volume of concrete is the best.

Mr. R. A. Cummings, a structural concrete contractor, of Pittsburg, Pa., after the conclusion of this paper addressed the chair and made some very complimentary remarks concerning the paper, concluding by saying that Mr. Thompson's solution of the aggregate question was by far the best that he had yet heard.

Mr. George L. Stanley, of Ashtabula, Ohio, being the only member present of the committee on streets, sidewalks and floors, presented a paper pertaining to sidewalk construction:

THE USE OF SALT IN CONCRETE SIDEWALK CONSTRUCTION.

BY GEO. L. STANLEY, ASHTABULA, OHIO.

Mr. President and Gentlemen: After an experience of fourteen years in concrete work, I feel as though I was still a learner, and hope during this session of our association to still be a learner, and if my suggestions, as the result of my experience, are of any benefit to my fellow craftsmen, I would not have you give me alone the credit, but to many who have been making laboratory and practical tests in concrete work in different parts of the United States, and among those I would make mention of, is the honored president of our association.

The fact that it is often necessary to do considerable work in freezing weather makes it desirable to be able to lay and care for the work in such a manner that it may not be damaged by frost. The foundation should be porous and as well drained as possible, as freezing the first twenty-four hours after the walk is laid is liable to expand the ground under the walk, which will crack the walk before the hard setting takes place. The use of what salt can be dissolved in the mixing water will prevent the walk from being scaled or cracked by the frost expanding the concrete.

Should the sand and gravel be very wet, salt should be spread on batches with the cement so as to be mixed with the sand and gravel the same as the cement. In case this is done the mixing should be continued considerably longer so as to dissolve the salt as much as possible before wetting, and after wetting the batches should be turned once or twice, as prolonged mixing increases the strength of the work.

In cool or freezing weather, only water enough should be used in wetting so that the work can be floated and troweled and covered very quickly after the concrete is placed in the molds. The setting takes place slower in low temperatures, but sidewalks can be given the public for use from one to four days sooner when salt is used.

The safest manner of caring for the walk during the hardening is to cover with sawdust, planer

shavings or earth, and to cover the whole walk with canvas or other covering so as to keep the walk as dry as possible, which will hasten the hardening and prevent the frost from expanding the ground under the walk.

I have laid walks as late as December 20, and the past season about 9,000 square feet was laid after November 1. I use about 10 per cent more cement in cool or frosty weather so as to insure strong work. Walks in which I have used salt during the last seven years are fully as satisfactory as those laid without salt.

As to the effect of salt on sidewalks, there may be a difference of opinion among concrete experts, but there is a general agreement that, if properly used, it will assist in preventing injury by frost, and if there are any injurious effects the benefits from its use leave the walk in a much better condition than it would be without its being used.

Most tests are tensile and laboratory tests, and the briquettes are not usually stored on the ground as sidewalks are laid, which does not show the effects of different atmospheric and weather conditions on the concrete; but some tests have been made by engineers in charge of government and other work which are very instructive.

In December, 1904, I moulded about seventy-five 3 inch cubes and in one-half about 15 per cent salt was used for the purpose of determining the effect of salt under different atmospheric conditions. Those wet with salt water were stored the same as those wet with fresh water. One-half of the cubes were placed in the open air on the ground before initial set, the temperature of the air being about 10 deg. Of course those wet with fresh water were frozen solid, but those mixed with salt water showed no effects of frost when the temperature was 10 degrees above zero, except the hardening set was very slow. The other half were hardened and stored in a damp cellar on the ground until packed for shipment.

The cubes were all carefully packed, marked and shipped to Case School of Applied Science, Cleveland, Ohio, December 15, 1905. I was assisted by two of the 1906 engineering class in breaking the cubes. The records of the breaking of the cubes have been tabulated and I leave a copy of this paper with the secretary for such use as may be thought best in the interest of our association.

Of those stored in the cellar, there was but little difference between those wet with fresh or salt water. But of those stored in the open air out doors there was considerable difference; about 50 per cent in favor of those wet with salt water, and what was the most surprising was that those wet with salt water and stored on the ground out doors showed about 22 per cent stronger than those wet with salt and fresh water and stored in the cellar.

These cubes were all in the same proportions of cement, sand and gravel, and about the same consistency, so that the place of storage and atmospheric conditions were the only influences which could make the differences in the breakings.

The conclusions to be drawn from these tests are that 15 per cent of salt can be used in the mixing water without injurious effect on concrete three inches thick and placed on the ground. That salt will prevent injury to concrete by frost at temperatures about 10 degrees above zero. That concrete without salt in the mixing water will be more or less injured by frost if laid in freezing weather. That if there is no frost in the material used and if properly cared for, concrete sidewalks can be laid in freezing weather and be strong and durable.

This was a very able argument of the subject, and upon finishing his reading Mr. Stanley was asked many questions which he answered in a very considerate manner and proved himself to be an experienced master on the construction of cement sidewalks.

The convention then adjourned until 8 o'clock.

EVENING SESSION, JANUARY 9th.

The delegates were all in their seats promptly to hear the opening feature of the evening session which was the address of President R. L. Humphrey, accompanied by stereopticon views. In his own characteristic manner he handled his subject pertaining to concrete construction of various kinds in a very able manner, both from the standpoint of a scientist and a practical man.

Mr. A. L. Johnson, civil engineer of St. Louis, Mo., next addressed the convention upon the sub-

ject of "Steel for Re-inforcement," with stereopticon, citing his own experience as well as the observation of others. This paper elicited a great deal of criticism and discussion from other students of the re-inforcing question who did not altogether agree with some of Mr. Johnson's views. However, the discussion developed a great deal of up-to-date information. The prolonged interest and discussion of this subject carried the meeting up to the time of adjournment.

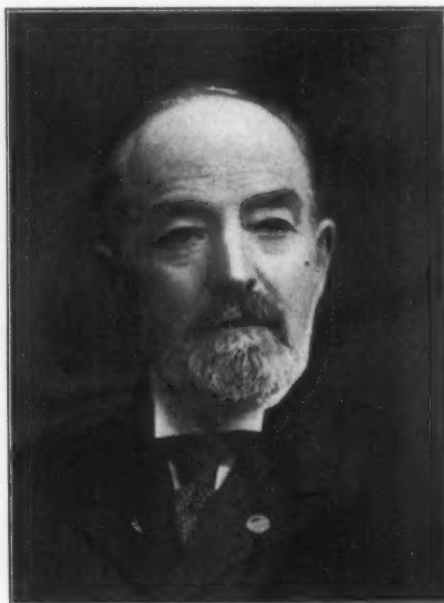
MORNING SESSION, JANUARY 10th.

There was only a very slight attendance promptly at 10 o'clock this morning, but after the program was started the delegates came in in great numbers. The first matter taken up was the paper of Mr. C. A. P. Turner, of Minneapolis. Mr. Turner is an engineer of high reputation and successful experience as the readers of this paper will no doubt recall.

CEMENT AND BUILDING CONSTRUCTION.

BY C. A. P. TURNER.

The members of the Cement Users' Association may with reason congratulate the American Portland cement manufacturers on the uniformity and reliability of their product. They have reached this degree of perfection in their cement only by careful study of methods and materials used, combined with systematic tests of the resulting product.



GEO. L. STANLEY, ASTABULA, OHIO,
VICE PRESIDENT FOR THE SIDEWALK DIVISION.

The cement user may well profit by their example and study his methods in the use of cement if he is to produce results at all in keeping with the high grade and possibilities of the material he is using.

In foundation work Portland concrete is largely replacing footing stones, giving a continuous monolithic construction which, where the ground is soft, may be readily and cheaply reinforced with rods and where the conditions are still more unfavorable and piling is used, a concrete cap reinforced has evident advantages over timber.

In placing the material it may not be amiss to suggest to those who expect results without attention and care on their part, that failure to properly mix the materials and depositing the concrete haphazard without consolidating it by tamping and puddling, or allowing mud and sand to flow around the several shovelfuls or barreelfuls deposited, will quite likely result in footing of little more value than one the writer was forced to remove from under a reinforced column five stories. The contractor, who appeared careless to a reckless extent and thoroughly incompetent, rather than dishonest to this extent, stoutly asserted that the mixture was according to specifications and

the pier according to plans. When clamps were put on the column and the footing removed, bad cement was the excuse. The idea that bad workmanship and lack of cement had anything to do with it, seems not to have occurred to him, although in removing the material, a pick could be driven into it half the length of the blade and streaks of sand and clay unmixed with cement could be found in nearly every sample.

In exterior walls of concrete, many depend for finish, on a plaster coat after the work has hardened up. Wetting the walls thoroughly sometimes enables a sound coat to be applied, though often there is scaling and chipping when the work dries too rapidly. Removal of the forms early, rubbing down all inequalities before the work has hardened and as soon as it has sufficiently set to stand without forms, may obviate this difficulty.

As a cheaper form of construction, cement brick and concrete blocks are coming into use. The general prejudice against this type of construction among architects, can readily be accounted for. Too many block manufacturers believe in mixing their concrete 1 cement to 7 or 8 gravel, and selling it for a 1 to 3 mixture. Then again through the unfortunate fad of imitating rock faced stone, our concrete block friends must be credited with the production of the most monotonous building material ever placed on the market.

Too little attention seems to be given to artistic effects that should readily be obtained in the manufacture of blocks at a comparatively insignificant increase in cost. The practice of facing with a selected material, such as fine white sand or crushed marble or granite, with a rich mixture of cement, seems to have been done only to a very limited extent, while as a matter of fact, it is practical and comparatively inexpensive. By casting the faces downward, the facing may be made thin and quite dry and the backing wet enough so that it will supply the necessary moisture to properly crystallize and harden the dryer facing. The object of making the facing dry is, of course, so that it can be removed from the mold without sticking to it and destroying the finished surface, which will be the result of using a wet or moist mixture. By a dry mixture, the writer does not refer to one which is mixed without water, but to one that is not sufficiently wet or rather moist, to stick to the plates of the machine when tamped.

The writer's observation of the manufacture of cement brick, is that by the use of a dry facing of fine white sand mixed in the proportion of 1 cement to 2 sand, averaging a quarter of an inch thick, backed by a mixture of 1 cement to 4 coarse sharp sand, made wet enough to stick together when a sample is squeezed between the thumb and finger, that very satisfactory results were obtained and with no trouble in curing. On the other hand, such a mixture would force the workmen to wipe the division plates of the machine every second or third batch, and they were too much inclined to save themselves this trouble, by using a dryer mixture which could be cured, if at all, only with difficulty and repeated wetting. The difference in the amount of moisture in the two cases is slight, but the difference in the product at the end of twelve hours is very marked. At the end of that period, the brick made with a moist backing would set so that the corner would have an edge sharp enough to cut the skin of the finger if rubbed along it, and if the brick were thrown against a hard block it would break in fragments like a burned brick. On the other hand, in one made with the dry backing, the corner could be readily sanded out, and if the brick were treated as the other, there would be nothing but sand left of it.

It may be imagined by some that there would be a plane of cleavage between the rich facing and the leaner backing, but in no case has the writer been able to break the facing away from the backing, cleavage occurring in all cases either one side or the other of this plane.

The cement brick the writer has had experience with, unless of considerable age, do not stand shipment well. Better methods of curing will undoubtedly remedy this and seem equally applicable to the block business. A warm, damp atmosphere is most conducive to the hardening of concrete, and it would seem that a curing chamber in which the blocks and bricks could be placed and subjected to an atmosphere of exhaust steam, would be an ideal arrangement. To properly realize the possibilities in this line of work, evidently requires honest and thorough work combined with a careful study of method and results and when this is fully realized by those engaged in this line, we may expect the architect will be ready to favor the material which you have demonstrated, to be strictly highgrade. This demonstration, however,

must come from the manufacturer, as he can not consistently expect the architect to specify something which might be satisfactory if the work was well executed, with the chances against this being realized.

In interior construction the advantage of concrete properly reinforced, over timber or steel, lies in its permanence, the perfect protection of the steel against corrosion or destruction by fire, and last, but by no means least, to the peace of mind of the builder. The avoidance of complicated shop details and the opportunity for the annoying little errors and endless delays incident to structural iron work.

In treating the subject from the popular standpoint, the writer would say a few words as to the reliability of the construction as compared with steel or timber. Ignorant abuse will render dangerous the best material the engineer uses—for example, some months ago the writer was called upon to inspect some coupler pockets forged out of 1½ inch by 4 inch bars. They were worthless, the writer was told, and going to the pile and selecting four, they were placed on the ground and struck a few sharp blows with the sledge. A single blow fractured ten square inches of metal in two cases. In normal condition this area would carry 600,000 pounds in tension. Taking the shank to a steam hammer, the center was bent flat on itself without fracture, proving that the smith had burned the steel in forging until it was worthless at the bend.

Similar inexcusable ignorance in working concrete will likewise result in inferior work, but by no means to such an extent as that instance in the case of the steel.

While the use of reinforced concrete is older than steel construction, it is only the low price of Portland cement that has brought it rapidly to the front. During the time that cement was expensive, it was naturally used sparingly and it is a fact that this custom has had an unfortunate influence in the introduction of reinforced concrete. The use of too weak a mixture and the consequent failure to secure the requisite adhesion of the steel to develop the limited strength of this concrete has brought out a number of deformed bars, the advocates of each claiming special merits.

As regards the question of adhesion, I think a few words may not be amiss. In setting up the concrete shrinks, and this exerts a severe pressure on the bar. Now, the intensity of this stress depends on the amount of richness of the concrete. With a weaker mixture, of course, we do not get this bond between the steel and the concrete, and it makes no difference whether we are using a plain bar or a deformed bar, as far as this part of the adhesion is concerned. Again, where the bar is of irregular form this shrinkage strain produces unequal stress on the concrete, and it would seem logically to be a sort of weakness. The circular form of the bar would seem to be the ideal in this respect. Now, in the distribution of the metal through the concrete we must have it disseminated through the mass. We can not let the bars down alongside of each other and strive to get the best results. In taking care of the stress and tying the building together with continuous construction these bars must be bound, whether they are deformed or plain, and the bars, as I look at it, if they allow the lines to secure the maximum strength, will get all the anchorage that is necessary.

The condition of the concrete, where it is submerged is not as favorable to this bond, between the concrete and the steel. Whether we should treat it differently is perhaps open to question. Another claim that is generally made for the deformed bars is that in case the work is overstrained, that it will be less damaged, if we have this mechanical bond. This may be open to question logically for the reason that there is ample experimental evidence to show that concrete will flow a certain amount, as indicated by Prof. Wollson's test; and it becomes then a question as to how the deformations in the bar will act, whether it is not preferable to allow the concrete to flow with the bar, and perhaps a certain amount of misplacement occur, and still have the concrete intact around the bar, or have it sheared and broken in details by such formations as are used.

Another point which I do not think has been usually given consideration is this: We have evidence of Mr. Considere showing in his experiments that the concrete could be stretched to a number of times its deformation when the reinforcement was disseminated through it. His test pieces were small. The bars were close together. We have Prof. Turner's work, which is equally creditable, showing that there were hair cracks in his con-

crete under comparatively low working stress. If reinforcement enables the concrete to stretch in the vicinity of the reinforcement, there is a logical question as to how far through the concrete this influence will extend. There must be a limit, and we must take into consideration the evidence on both sides of the question if we are to proceed in a rational manner in our designs. I am ready to accept the evidence of both scientists and be governed accordingly, and am ready to look for new information on that line as it may be developed in tests.

Now again, I have made the point in the difference in the richness of the mixture, the amount with which it was consolidated. The concrete samples put up by Considere were probably of a very much higher grade than the concrete experimented on by Prof. Turner. The published tests showing the roughness of the specimens do not compare favorably with the work that professional concrete men are executing every day, and conclusions drawn from them will not be applicable to the better work. All of these things we must take into consideration to arrive at a true and fair understanding of the work.

As the writer has secured, as far as he is aware, greater strength in actual construction with special arrangements of plain bars, than anything claimed by the advocates of special bars, he is inclined to regard the advantages claimed for them as a somewhat imaginary quantity. In designing the reinforcement of beams and slabs, advantage should be taken of the principles of continuity, since with constant section we have to provide only for two-thirds of the moment of a simple beam and we have but one-fifth of the deflection. Further, by properly lapping the rods we may double the section over the support and require theoretically but half the metal necessary for a simple beam the same strength. This system of design calls for the major section of metal for the flange reinforcement over the support and furnishes ample provision for shear.

In constructing work in this line, it is well to bear in mind that centering is a considerable item and that each additional beam is an extra expense. This fact led the writer to use larger and larger slabs and finally to advocate construction of floors with column spacing 16 to 18 feet centers with no beams whatever, but simply a plain slab and columns. In this connection a few remarks regarding the theory of reinforced concrete may not be amiss. The theory based upon the elastic properties of the dual material, has been derived from experiments on beams and slabs reinforced in one direction and agrees fairly well with the results of tests of work involving the conditions considered in this theory. The conditions resulting from reinforcement in a number of directions are, however, not properly considered in any work that the writer is familiar with. Mr. Chas. F. Marsh makes this statement in his work on reinforced concrete Part 5, "Unfortunately it can not be said that we have a thorough knowledge of the properties of reinforced concrete. It may be that we are wrong from the commencement in attempting to treat it after the manner of structural iron work and that although the proper allowance for the elastic properties of the dual material is an advancement on the empirical formulae at first employed and used by many constructors at the present time, yet we may be entirely wrong in our method of treatment. The molecular theory, that is, the prevention of molecular deformation by supplying resistance of the reverse kind to the stresses on small particles, may prove to be the true method of treatment for a composite material like concrete metal. This theory is the basis of the Cottanc in construction which certainly produced good results and very light structures, and in Considere's latest researches on hooped concrete are somewhat on these lines." As the writer has been able to place a test load on slabs equal to two or two and a half times their figured ultimate strength by the formulae presented in Mr. Marsh's treatise, without injuring the construction nor apparently developing more than a third its ultimate strength, he is inclined to agree with Mr. Marsh and is in the habit of designing these slabs and guaranteeing them, not on the basis of text book theories, but by the known relation of the new slab to the slabs tested as regards the depths and the moment of the super-imposed load.

As regards the materials for our aggregate, as a matter of economy we use either crushed stone and sand or sand and screened gravel without screening. In crushed stone, the harder the stone the stronger our concrete. For reinforced work we use a mixture of about equal parts of sand and

crushed stone, ranging in size from a pea to ¾ or 1 inch diameter and about 1½ barrel to 1¾ barrels of cement to the cubic yard of concrete. For columns we find it cheaper to secure the compressive strength by the use of a rich mixture from two barrels up to two and a half barrels per cubic yard. We can depend on such concrete showing a crushing strength in cubes upwards of 6,000 pounds per square inch and can readily keep the size of our columns to reasonable dimensions with ample strength. The system of reinforcement that we use, consists of a fair percentage of vertical reinforcement used for columns with riveted hoops at intervals of the length. Where we do not employ beams, we bend the vertical reinforcement outward, making an enlarged cantilever top to the column, which is buried in the slab and supports the slab reinforcement and we reinforce the slab in four directions.

Where we employ beams, we prefer to break the floor up into panels rectangular, and if convenient approximately square and reinforce our slabs in two or more directions. If we are using gravel for the aggregate, we sample this carefully and vary the amount of cement, dependent upon the character of the material. If the gravel contains some clay and considerable finer material, we use a larger percentage of cement, endeavoring to get practically the same results regardless of the composition of the aggregate. Many have the idea that crushed stone has some peculiar advantage over shingle or the round stones that we find in our gravel. The results of a series of quite comprehensive tests made at Duluth by the Great Northern Power Co. were kindly furnished the writer by Dr. D. A. Reed, their assistant chief engineer. The mixture as I recollect, was practically a 1-3-5. The aggregate was crushed shales rock first, second, crushed Duluth granite and third, lake gravel. My recollection of the percentages of these tests is that the crushed granite which is practically a hard trap rock, only showed a little over 90 per cent of the crushing strength of the gravel concrete, and that all the results seemed very satisfactory, running from 3,200 to over 4,000 pounds per square inch.

In mixing the material, enough water should be used for reinforced work so that the mixture should have the consistency of brick mortar and flow slowly to fill the molds. No tamping should be required, but even with this mixture a certain amount of puddling and jarring or shaking the reinforced rods is desirable if the best results are to be secured. Where practicable, as much of the work should be run in at the same time as possible, since a beam or a slab which is spliced will show much less stiffness than one which is cast at one time, a condition which can be readily accounted for by the shrinkage strains in the concrete.

A question which is quite frequently raised and concerning which many architects seem to be worried, is whether reinforced concrete can be successfully executed in winter. In engaging in this line of business, the writer will say frankly, that this question gave him some little concern. His previous experience in building bridge piers when the temperature was at times 25 and 30 deg. below zero, caused him to consider it practicable to execute reinforced concrete work in the winter and we are now carrying it on every day just as we would in summer, except for the slight inconvenience that we have to keep the snow and ice out of our forms until we can fill them with concrete and are obliged to heat the material that we use. When this is properly done, freezing does not appear to damage the work as much as too rapid drying in the hot summer months.

We have here a number of views of work that we have executed, some showing test loads that have been applied. We have put up nearly all kinds of structures—office buildings, machine shops, warehouses and paper mills, and the writer has recently designed some reinforced concrete for a large power station in which there are to be three of the largest vertical generators that have been built, having a capacity of 7,500 Kw. with 25 per cent overload. These are to be run at the rate of about 380 revolutions a minute and are to be supported on a reinforced concrete slab of about 21 feet in span.

This paper was well received and was the object of considerable favorable discussion, as he used a stereopticon showing the great advantage some of the construction of concrete with which he had been connected and which showed remarkably rapid advancement in the industry.

Mr. R. W. Lesley, past president of the American Society of Portland Cement Manufacturers,

contributed a paper which he put in his forceful and intelligent way of showing an intimacy with the subject which comes from long study and attention.

WHAT THE CEMENT USERS OWE TO THE PUBLIC.

BY ROBERT W. LESLEY,
PRESIDENT AMERICAN CEMENT CO.; VICE PRESIDENT
AM. ASS'N TESTING MATERIAL.

It is gratifying to be present at the second meeting of the Cement Users Association, and to realize the great interest that all those who have to do with concrete in its various forms, are taking in this association.

There are associations of manufacturers of Portland cement; of those interested in concrete and also for the testing of materials, and it is but fitting and proper that the actual users of cement should get together and join hands in a common movement for the improvement of the character of their work and for good fellowship and business co-operation.

The development of this new art of making concrete in its various forms is one of the remarkable developments of the last decade. The writer, at a meeting of the engineers club and the board of trade at Scranton, Pa., early in 1900, had occasion to look ahead, and in a measure to predict what was going on in this field in this country. At that meeting, speaking of the pliability, the flexibility and the adaptability of the American individually to the various great purposes which form the industrial and scientific development of our nation, he had occasion to state that the next age succeeding the age of steel, would be practically known as the Cement Age, and that it was but philosophical and reasonable that in an age of such great adaptability and plasticity in the individual, that the building material should be of equal plastic character and be represented by concrete, plasters, asphalts or materials of similar characteristics.

This prediction, made possibly at random, in this country, was based upon the early development of the art of concrete construction in France, under such experts as Coignet, Bordenave, Hennebique and others, and was looking to the American idea of quick construction at lower cost under most favorable circumstances, and all these desiderata seemed to be met by the concrete construction which was then being done in a very small way in France. The prediction has been more than verified, and the proof of it is that in the fifteen years just passed, the production of Portland cement in this country has jumped from 335,500 barrels in 1890, to practically 31,000,000 or 32,000,000 barrels, which is the estimated output for 1905.

Now, we Americans, in our progressive, go-ahead, devil-may-care way, sometimes go too fast and sometimes take a good many risks, and this business of concrete construction, of concrete block manufacture, of concrete paving and of the many other forms of concrete work, has its dangers as well as its advantages.

The history of the concrete sidewalk business in the Eastern cities, is quite an illustration of this important point. When Portland cement was first brought into the United States in any quantity in the years from 1880 to 1890, its principal use was in the construction of sidewalks, and a number of good workmen from the other side and a number of good American workmen instructed by these, engaged in this business. Portland cement was a high priced commodity. It paid a large duty and the freight was considerable. These early workmen, realizing that they were engaged in a new industry, devoted care, time and skill to the production of the best sidewalk, not a sidewalk that would be as good as brick, stone or slate, but that would be better than any of these sidewalks, relying upon the American desire to pay the highest price for the best article.

These pioneers in the field of cement work went ahead doing work that had no equal. For this work they charged good prices, and upon it made good profits as the reward for their labors. There exist to-day in the cities of New York and Philadelphia, pavements that were laid in the early eighties that have stood the most severe traffic, and that to-day are stronger and less worn than the stone pavements around and about them. In the Broad Street Station, Philadelphia, there is a concrete sidewalk, built with one of the leading brands of German Portland cement, which is laid between the train shed and the main station building, and to reckon the millions of feet that have passed over, rubbed and scuffed upon this pavement during the twenty years of its existence, would be to enumerate many times the population

of the United States—and the pavement is as good as when first laid. This is a sample of the old concrete sidewalk work that was done by the pioneers in that industry.

Following these, came others, who with the natural desire to make more money, to get more work, pursued other paths and sought, by the skimping of material and slighting of work, to produce sidewalks in competition with the older established concerns. The result soon made itself seen. A sidewalk is like the "light" of the Bible—it can not be hid under a bushel. It is an everlasting testimony to its own qualities. This class of work scattered all over many of the principal cities and seashore resorts of the East, soon began to disintegrate, to scuff, to spot and to show all the marks of bad workmanship and bad materials. Needless to say that this diversion from the path of right and fairness, unsettled the minds of those having to do with the use of concrete sidewalks, and it is a definite recollection of the writer that there was an absolute dead-point reached in the laying of concrete sidewalks in many of the Eastern cities, which endured for several years, and there was very little increase, but an actual falling off, in the laying of these walks, which a few years previously had come to the front as the pavement of the future. The swing of the pendulum came again, and with the advent of American Portland cement; the economy in price caused thereby; the realization on the part of those having to do the work that only good materials and careful attention to details would produce satisfactory pavements—came a return in the boom of cement sidewalks, which has now spread over our whole country.

In instanting the rise and fall, and again the rise of this particular branch of concrete, the writer does it for the purpose of bringing before you all here, the great importance of good work. We are, so far as the manufacture of concrete blocks and production of reinforced concrete buildings, almost in the exact stage that the cement paving business was when it first began. Many rushed into it, incapable of attention to details, and incapable of the production of good work. Many rushed into it as a new business, hoping to realize quick profits. Those naturally, by their lack of attention to details, by the skimping of cement, by the slighting of the work, threw discredit upon the whole industry, and it is the opinion of the writer, that just such an association as that here to-day, formed for the upholding of each other, and by the upholding of each other, the upholding of the object of the association, will bring about results in the field covered by this association, without that melancholy falling off that was shown in the early days of the cement sidewalk business. No man, member of this association, could be, would be or should be guilty of some of the practices that prevailed in the early days of the cement sidewalk.

Only instanting how little is understood of this great art which you are all engaged in, and to show how little those in this country who are always the "all knowing," namely, the newspapers, actually do not know about reinforced concrete, and how possibly from some of these newspaper articles, others might be misled, I will only quote one paragraph from an article in a Buffalo paper describing the fall of a concrete floor in that city.

After describing the method under which the floor was built, the newspaper man interviewed the contractor and the latter is reported to have said, that "he did not know what caused the collapse—that the floor was of a new type, made to do away with piers, girders or supports."

Now from such an explanation of a floor in a reputable paper, given by a reputable contractor, others might well imagine that a concrete floor was different from all other floors, inasmuch as it was self-supporting. It might represent an actual investment, or what might be called "floating capital." It might be carried by a balloon, or the sheer strength of this wonderful material we all rely upon, viz: reinforced concrete, might enable the floor to carry itself by some means unknown to the laws of gravitation or nature. It was somewhat like Mohamet's coffin floating between heaven and earth. If, in this case, the newspaper and the contractor give such explanations as these as to the collapse of a floor, will it be at all surprising, in the days to come, uncontrolled by proper specifications, ungoverned by proper requirements as to quality, quantity or character of materials, that some daring man will endeavor to build some daring skyscraper of this material, concrete (which of all materials, stands greatest abuse), and build it in some remarkable way whereby some terrible disaster will be caused, throwing discredit not

only upon the art of reinforced concrete construction, but upon those engaged in the art and upon the manufacturers of the materials going into the construction?

Concrete building construction, as you all know, is very different from concrete pavements. The failure of the latter can only cause very slight injury to person or property.

The cement manufacturer has been accused of being in some way, a "pullback" in the great development of concrete construction. This is a mistake. He is only conservative in the light of his own experience. He has had his troubles in the introduction of his new material in this country against the well known and well established foreign brands; he has had his troubles in building up his reputation, in establishing his works and in introducing new machinery—all incidents of a new industry. He is a little older in this field than you are, but his interests are your interests, and your success is his success. He is tied to you and you are tied to him. Reinforced concrete without cement; concrete blocks without cement, would be Hamlet with Hamlet left out, but in all these forms of construction the first blame of a failure is usually put on the cement. When all remedies fail it has to stand the burden. It has nice wide shoulders, great amiability and carries the blame like a little gentleman, and while the cement manufacturer, as the pioneer of a new business, looking back during the years of the establishing of his business, realizes possibly, he has been to blame for some of the alleged sins of his material, he feels that he has always been endeavoring to improve the quality of that material which must be beyond suspicion. It is for this reason that possibly he has been a little conservative in connection with all these new methods of concrete construction. His endeavor, so far as his article is concerned, has been to make the best; he formed his association some years before you formed yours, and on the same lines. He realizes that the best way to make the best material was to join with the critics of his material and make specifications to govern its production.

The American Society of Civil Engineers had a Committee on the Manipulation of Cement Tests; the American Society for Testing Materials had a Committee on Cement Specifications. At the instance of the latter society, a joint committee on the making of cement specifications was formed, and to the two associations above named, were added the Association of American Portland Cement Manufacturers, and the American Railway Engineering and Maintenance of Way Association. This committee was at work two years, and finally perfected a specification with which you are all familiar. No people co-operated more toward the work in the forming of that specification than those who were to furnish the material to be judged under the rulings thus made. Submitting himself to the most strenuous tests, the most strenuous requirements that had ever been put in any specification up to that time, the American manufacturer, believing that the best was none too good for the American public, joined hands with his engineering critics, no longer critics, but associates and co-operators in the good work, and agreed that his product should meet those stringent requirements. The effect of this has been to give American Portland cement a standing throughout the world.

Following on these lines, those engaged in the construction of reinforced concrete felt that there was danger in this character of work, unless under proper engineering supervision, and unless building regulations embodied engineering skill. The danger of lives and to property by the construction of these large buildings destined to carry large loads, and to house large bodies of people, was the governing factor in the desire of the constructor of reinforced concrete to have some rules of a permanent character to govern his work.

Following on the lines already referred to in the making of a specification for Portland cement, the American Society of Civil Engineers took the initiative and appointed a committee on concrete and reinforced concrete. This committee in accordance with its instructions, affiliated with itself the American Society of Testing Materials, American Railway Engineering and Maintenance of Way Association, and Association of American Portland Cement Manufacturers. It also held meetings with the National Board of Underwriters, National Fire Protection Association, The Concrete Block Machine Manufacturers Association, and the National Association of Cement Users. It is now engaged in carrying on a series of the most exhaustive tests on cement, sand and stone, and on the various

forms of reinforced concrete construction at the United States Laboratory at St. Louis. It is expected and hoped that out of this serious and careful work, there will be formulated such rules, regulations and specifications for reinforced concrete as will, by their simplicity, definiteness and skill warrant their adoption by the building departments of all the cities of this country to govern construction in reinforced concrete.

Again the case is shown of the contractor or the producer co-operating with the critic or the agent of the consumer in making specifications which are to rule his product, standards of quality of reinforcement and of safety, which in time will make the construction of the reinforced concrete building as definite and as accurate as the construction of a stone, brick or frame edifice.

Now, having brought before you here to-day what has occurred in the very beginning of the use of Portland cement in the United States; having shown you the swing of the pendulum which nearly destroyed one branch of this business in its infancy; having shown the lack of information and the difficulties that even to-day beset many forms of construction; having called your attention to what the cement manufacturer is doing to raise the standard of his product, to protect his reputation by subjecting his material to the highest tests; having shown you what the builders of reinforced concrete are doing toward standardizing their method of construction and fixing rules and regulations governing their business, I want to end this paper by suggesting that this association, so far as this branch of its business is concerned, shall join with its critics, the engineers and the architects, and shall lend a helping hand toward the standardizing of all forms of reinforced concrete construction and of concrete block construction, so as to insure to the consumer safety, durability and permanence in all construction done by members of this body.

Mr. Lesley's paper was well received by his audience as it was sparking with wit and not without a good many palatable lessons.

President Humphrey called the first vice president, Mr. Merrill Watson, to the chair while he took the floor to address the convention concerning the tests which are to be made in connection with the U. S. Geological Survey to determine the relative strength of concrete to other materials and have such information well circulated. He urged upon the association the necessity of each man of the convention lending his assistance to secure greater appropriations from Congress for this great task and requested that each member write to his separate congressman, petitioning him to this effect. The importance of co-operation in this matter can not be well over-estimated and we trust that not only every member of this convention, at his command to push forward this important but every user of cement in this country will put his shoulder to the wheel and aid in every way measure for the advancement of the concrete industry of America. Mr. Humphrey is personally connected with the work and needs the co-operation of the entire industry.

The following memorial to Congress was unanimously adopted:

Resolved, That we, the National Association of Cement Users, in convention assembled at Milwaukee, deem the investigation of cement, mortars and other structural material now being conducted by the United States geological survey of such far-reaching importance to the people of the country, that we respectfully ask the Congress of the United States to make large provisions for the continuance of this important work on a more extensive scale.

The hour for adjournment was reached with the conclusion of these remarks by the president.

AFTERNOON SESSION, JANUARY 10th.

This session of the convention was opened by the reading of the report of the executive committee by Secretary Charles C. Brown. This proceeding was prefaced by some timely remarks by President Humphrey in regard to the management of the association. The report stated that at the end of the Indianapolis convention the association had \$280.00 profit on hand. This sum was not sufficient to print and distribute the proceedings of the 1906 convention and it was through the kindness of the American Association of Cement Manufacturers that they advanced the money necessary to supply each member of the Cement Users' Association with a copy of the proceedings of the Indianapolis convention. The report showed that the money advanced by these friends of the industry had been returned since that time and that at the date of the report, the association had a cash balance on hand of \$140.00. The report also showed that since the 1905 convention one hundred and twenty-two members had paid dues for 1905 and fifty-two for 1906. This is hardly a very large proportion and it is to be hoped that the financial support of the cement users association shall receive more attention upon the part of those who attend the annual meetings and endeavor to put the association upon a good, firm financial footing.

After the reading of this report the president took occasion to mention the names of the cities inviting the presence of the 1907 convention, and among these were Columbus, Ohio, Norfolk, Va., Chicago, Denver, Cincinnati, Jackson, Mich., and Toledo, Ohio. No action was taken at this time concerning these petitions.

A charter and articles of incorporation which had been prepared were then read by Secretary Brown. The object of these is to place the association upon a permanent and lasting footing as well as upon a sound business foundation. There was some objection by some of the members to the effect that the charter granted the executive board too much power, but a motion was made and carried which resulted in the adoption of the instruments. In this motion was also expressed the will of the convention to have the executive board proceed to incorporate the National Association of



JOHN H. FELLOWS, SCRANTON, PA.,
RE-ELECTED SECOND VICE PRESIDENT.

Cement Users along the lines as read. In connection with the reading of the charter the question arose as to the eligibility of the Canadian and other cement users outside the boundary of the United States, to membership in the Association, but the president quickly explained that these were not barred from the privileges of the organization and that any cement user would be admitted to full membership upon payment of five dollars annually.

Mr. E. S. Larned, civil engineer of Boston, then read the report of the Committee on Testing Cement and Its Products, which was unanimously adopted by the convention.

An interesting feature of this session was an experience meeting, or rather topical discussion, led by Mr. Arthur N. Pierson, a concrete block manufacturer of New York, on the subject of concrete block manufacture, during which the views and opinions expressed by different delegates, brought forth lots of new information concerning the preparation of aggregates, the modes of mixing and curing as well as many other educational points in this important branch of the industry.

The committee on nominations reported the following nominations: For president, Richard L. Humphrey, of Philadelphia; first vice president, Merrill Watson, of New York; second vice president, J. H. Fellows, of Scranton, Pa.; third vice president, O. U. Miracle, of Minneapolis, Minn.; and fourth vice president, A. Monsted, of Milwaukee.

Mr. R. W. Lesley read this report in his capacity as chairman of the Committee on Nominations. The report was unanimously adopted and the secretary, upon motion of the convention, cast one ballot, electing the officers named above. All of these officers except Mr. Miracle, who takes the place of Mr. H. C. Quinn, of Dublin, Ga., as third vice president, served the past year in their respective capacities, and the re-election of them is a hearty endorsement from the association. Among the vice presidents in charge of the sections of the association is Mr. M. S. Daniels on the section of Concrete Blocks and Cement Products, who succeeds Mr. B. L. Simpson, of Kansas City, Mo., and Mr. E. S. Larned, of Boston, now in charge of the section on Testing of Cement and Cement Products, vice Mr. E. D. Boyer, of New York City. Other vice presidents of the departments of the association work will be announced later. After the announcement of these selections the convention adjourned.

EVENING SESSION, JANUARY 10th.

Mr. Louis H. Gibson, of Indianapolis, Ind., whose name appeared on the program for a paper on "Cement Block Architecture," as the opening proceeding of the night session, was not present, but his paper was read by Secretary Brown. Mr. Gibson has never had any experience with good concrete blocks, and taken as a whole it is probably just as well that he was not present, for there are hundreds of members who are steadily manufacturing every day, the very kind of blocks which Mr. Gibson has never been able to secure—according to his paper. This discussion by Mr. Gibson, which showed him to be unacquainted with the improved forms of concrete blockmaking now in vogue, was ably answered by Mr. Charles D. Watson, of Toronto, Canada, chairman of the Section on Art and Architecture, when he presented the report of his committee which immediately followed the reading of Mr. Gibson's paper.

Mr. Watson used a stereopticon in connection with his paper which had great effect in showing that his concern (which was only a sample of what many others are doing) were making all kinds of art features for perfect classic architecture out of concrete. In fact some of the illustrations thrown upon the screen showed the finest lines that any draftsman can produce and brought forth the remark from a number of the members that Mr. Gibson, of Indianapolis, ought to be presented with a full set of these handsome pictures for his future study. Mr. Watson's paper was indeed interesting as well as instructive and his views shown upon the canvas were complete evidence of the rapidly growing sentiment in favor of concrete for building purposes and the astounding development of the industry.

THE USE OF CEMENT AND CONCRETE FOR FARM PURPOSES.

S. M. WOODARD, U. S. DEPARTMENT OF AGRICULTURE.

Under the general title of rural engineering, that branch of the U. S. Department of Agriculture with which I am connected, namely, the office of Experiment Stations, endeavors to obtain and disseminate among the agricultural population of the country all information bearing on the various lines of engineering, with the exception of road construction, which will be of use to the agriculturist in promoting his prosperity. The greater part of our effort is devoted to investigations relating to irrigation, both in the arid West and the more humid East; to drainage for removal of alkali from Western soils and for the reclamation of overflooded lands or those too wet for profitable cultivation in the East; and to questions relating to the use of various forms of power and various types of machinery in agricultural operations; but we have also given attention to the subject of the design and construction of farm buildings and other structures, among the materials for which, cement seems destined to occupy an increasingly prominent place.

We have been collecting and are preparing to issue in bulletin form, information regarding the use of cement in farm constructions in both this country and abroad. It will be the aim of this publication to show the advantages of the use of cement for permanent structures, to show the methods and cost of the use of cement in such detail that farmers should be able to decide rationally as to its advantages, and, in general, to encourage and extend its use wherever it seems desirable.

Residences, barns, ice houses, silos, may be advantageously built entirely of this material, either

in the form of concrete blocks, or in monolithic construction, or it may be used only for foundations for cellar floors, barn floors, feeding troughs and mangers. It will serve for pavements of yards, walks, and approaches to buildings where mud is especially likely to accumulate, steps and inclines, hitching posts, watering troughs, etc.

Time is lacking to consider all these items in detail, but perhaps a few general remarks may not be out of place. Where concrete is used for floors and pavements on which animals sleep, provision must be made for ample bedding in cold weather to counteract the coldness of the pavement. On any pavement for animals the finished surface must be carefully left sufficiently rough that slipping will not be dangerous. For use with water the concrete must be made with special care to secure as impervious a product as possible. In cold climates exposed work must be so made as not to be injured by alternate freezing and thawing.

Watering tanks and troughs are perhaps rendered safer from injury if the interior surfaces are given a slant such that ice can not exert a pressure perpendicular to the surface. In the case of posts, many kinds and shapes with various types of reinforcement have been tried, and perhaps much remains to be learned, but this field seems destined to become a very important one, and a fortune is awaiting the one who can develop the field by showing how this use may be economically and satisfactorily accomplished.

In these various uses for concrete in replacing other materials, cost is an essential element. This depends so much upon local conditions, that general statements are difficult. At the eighteenth annual meeting of the Illinois Society of Engineers and Surveyors, one of the members stated that a great amount of work on the farm can be built of concrete for less money than when built of wood, and cited as an instance a feeding floor.

The manufacture of pipe for use in sewerage and drainage has been widely undertaken and naturally has met with as many difficulties as usually attend efforts in a new direction. But these difficulties have been gradually overcome and there seems to be no doubt that cement pipe can be readily made suitable for these purposes.

In connection with the diversion and use of water in irrigation cement has a wide usefulness. Concrete is an admirable material for dams, head works of canals, regulating gates, drops in canals, division gates, bridges over and culverts under canals, canal linings, measuring and division boxes, distributing flumes and pipes, small reservoirs, and reinforced conduits. Some of these structures are in the domain of engineering rather than of agriculture and our attention for the present will be confined to such features as are related most directly to the farmer.

Cement lining for canals has been used in numerous places but the first and perhaps the best known case is the Gage Canal at Riverside in Southern California. This canal is about twenty miles long, with carrying capacity of 37.5 cubic feet per second, and was lined throughout about 1890.

The advantages secured by the use of cement lining are: a great saving in water from the cutting off of seepage; a great reduction in the number of interruptions to the service of the canal from breaks caused by the work of burrowing animals and by seepage in the fills; a large saving in the cost of annual repairs, and the prevention of the growth of vegetation in the canal with the consequent diminution in its carrying capacity.

Repairs on this cemented canal have not been excessive, and fifteen years' experience has amply justified the expenditure and the method used.

The work was done by contract at a cost to the canal company of about five cents per square foot for the portion which was plastered and thirteen cents per square foot for the portion with stone masonry lining. These figures agree closely with present prices for the same classes of work.

Cement is well adapted to the construction of boxes for the division and measurement of water. At Riverside, Cal., the water is conducted from the Gage Canal through underground pipes to concrete measuring boxes on each piece of ground where the water is to be used.

In the distribution of water through the California orchards it is quite customary to use, across one side of each tract, a head flume or pipe from which the water is discharged at as many points as it is desired for the irrigation of the tract. Although lumber has been much used for flumes it is being largely replaced by cement. A machine has been invented for making such flumes in one continuous line in place. The mixture used is one

part Portland cement to four of sand. The sand and cement are mixed into a mortar and fed into the machine, which forms the bottom and sides of the flume and compresses the mortar in one operation.

Similar flumes are also made in place by hand-tamping in molds in 12-foot sections. These differ from those that are machine-made only in the use of a heavier cross section and a leaner mixture of one part cement to six of sand and gravel.

After a flume is made and before the mortar becomes hard, small tubes from $\frac{3}{4}$ to 1 $\frac{1}{2}$ inches in diameter, the size depending somewhat on the size of the flume, are inserted in the side next to the orchard. These tubes may be of tin or galvanized iron, and each has a small slide gate. There should be as many tubes between the rows of trees as there are furrows.

Flumes are made in various widths, depending upon the amount of water to be carried and the grade. Compared with pipe used for the same purpose, as described below, flumes have two disadvantages. They are in the way of surface cultivation, and in orchards they receive the falling leaves which lodge in and clog the orifices. Hence, in orchards especially, underground pipe is now generally installed in preference to flumes.

Cement flumes are usually constructed by contract at prices about as shown in the following table. The price covers all materials and labor, including the necessary preparation of the ground, and the metal outlets and gates in the side of the flume:

Size—width Inches.	Price per foot. Cents.
6	16
8	18
10	20
12	22
14	26

Both cement and salt-glazed vitrified pipes are used in place of earthen head ditches. They are placed below the surface of the ground deep enough not to interfere with plowing, but seldom more than 2 feet beneath the surface, and various contrivances have been designed, some of which are controlled by patents, to distribute the water from them to a large number of furrows in nearly equal and constant streams.

A common practice in citrus orchards is to distribute the water from the cement pipes by means of short standpipes, of the same material, terminating in circular or semi-circular basins of cement mortar. Each basin has about six holes in the curved portion, through which water is fed to the furrows. The water may be turned on or off by operating a small rubber-faced valve, which is fitted over the top of the standpipe and is flush with the bottom of the basin.

The cement pipe may either be laid in place of a continuous line by a specially designed machine or it may be manufactured in 2-foot lengths and, after curing, be laid with cement joints.

Different sizes of pipe are used, depending upon the amount of water to be carried and the grade. An 8 or 10 inch pipe will carry from $\frac{3}{4}$ to 1 cubic foot per second. It is said that an 8 inch pipe will carry 1.5 cubic feet per second on a grade of 1 per cent.

For the manufacture of jointed pipe various types of collapsible sheet metal forms are on the market. A crew of three experienced men can make per day:

500 feet of 8-inch pipe,
400 feet of 10-inch pipe,
350 feet of 12-inch pipe,
220 feet of 16-inch pipe.

A mixture of 1 to 4 or 5 of Portland cement and coarse sand is used in making pipe. The mixture is used in a rather dry state in order that the forms may be removed from the pipe at once. In forming the pipe it is important that the material be well tamped. After standing for 24 hours, or better 48 hours, the pipes are turned over and the metal rings removed from the ends upon which they have been standing. The pipe must be allowed to set for two weeks to a month before being used. During this time they should be kept damp by being sprinkled two or three times daily and should be sheltered from the wind and from the direct rays of the sun. As soon as the pipe can be safely handled their interior surfaces are washed with a mixture of neat cement and lime water to reduce the seepage which is otherwise considerable while the pipes are new. A man can wash 60 2-foot lengths of 10-inch pipe per hour, using about a pound of cement per length. One barrel of cement will make 80 feet of 8-inch pipe with a mixture of 1 to 5. Cemented joints are made with a mixture of 1 to 3.

Cement pipe is ordinarily considered safe for heads up to 14 feet. Results of scattering tests have been collected as follows: Two lengths 16-inch pipe, united with a cement joint three weeks old, did not break under a head of 20 feet, or 9 pounds per square inch. A 10-inch pipe broke under a head of 20 feet. An 8-inch pipe did not break under a head of 46 feet, or 20 pounds per square inch. A line one-half mile long of 10-inch pipe specially made of 1 to 2 mixture carries constantly a head of 20 feet.

The following table gives sizes and ordinary contract prices for pipe in Southern California with the price of cement at about \$2.45 per barrel, net. The price for pipe laid includes the necessary excavation and covering the pipe after laying. The price not laid if for the pipe in the yard where they are made:

Size Inside Diameter	Thickness of Walls	Depth of Bottom of Pipe	Price for Continuous Pipe per Foot	Price for Jointed Pipe laid, per foot	Price for Jointed Pipe not laid, pr. ft.
In.	In.	Ft.	In.	Cts.	Cts.
6	1 $\frac{1}{4}$	2	6	18	9
8	1 $\frac{1}{4}$	2	8	20	12
10	1 $\frac{1}{4}$	2	10	24	18
12	1 $\frac{1}{4}$	3	0	30	24
16					45
20					60

The risers or stands for bringing the water to the surface and discharging it into furrows or portable pipes, vary in price somewhat with the different styles, but in general a simple riser with discharge openings costs about \$1.75. A riser with a valve or overflow for regulating the pressure in the pipe line above in order to maintain a uniform head on the discharge openings may cost from \$3.00 to \$6.00.

There have been laid in Southern California several hundred miles of cement pipe at a cost of \$1,000.00 to \$1,500.00 per mile.

In a few places large conduits of reinforced concrete have been built for carrying irrigation water, and if these structures prove satisfactory after thorough trial they are destined to come into much more extensive use. At present reinforced concrete seems to be the most available and the cheapest permanent material for closed conduits. It has been used for making inverted siphons to carry water under moderate pressures, but according to the reports of the U. S. Reclamation Service it is almost impossible to make large reinforced concrete conduits to carry successfully a pressure of more than 40 pounds per square inch.

Small circular reservoirs up to 150 feet in diameter made of concrete are in frequent use in connection with irrigation from wells in some parts of the West. An ordinary contract price for such work in California is 20 cents per cubic foot.

An enumeration of the possible lines of use of cement and concrete for agricultural purposes shows the wide adaptability of this material. But the question remains how to secure its widespread use. The farming class is probably the most conservative of any in a community, when it comes to trying new materials and processes. The use of cement in any but the most simple ways will always require some amount of skill and knowledge, such that a distinct class of artisans will be required to produce the most satisfactory work.

This implies that the cement work in any community must be done by a comparatively small number of men who will sell their time and knowledge to those for whom the work is to be done. Hence, the amount of work that will be done will depend a great deal upon the energy and activity of the cement contractor. It rests very largely with those handling and working with cement to determine how rapidly its use is extended in agricultural lines. Here is a wide field of effort open to those who will aggressively occupy it.

MORNING SESSION, JANUARY 11th.

On account of a request coming from the block men, the convention convened this morning at 9 o'clock instead of the usual hour of 10, which time was devoted exclusively to discussion of the block making question. Mr. A. N. Pierson, of New York, conducted this preliminary meeting and many good things of highest importance to the block men were brought forth.

* At 10 o'clock President Humphrey took the chair and the regular session of the convention was begun which started with a paper on "Manufacture and Use of Concrete Pipes," read by Mr. Henry Longcope, which contained some very useful information to contractors who are called upon to do heavy construction work.

sensation of his paper on "Air Tamping and Conveying Concrete Blocks." Mr. Sherer also touched upon the specifications of blocks, and answered many questions propounded by interested delegates. Lack of space in this edition prevents the publishing of this paper at this time.

The morning session closed after the reading of a paper by Mr. Will J. Scouff, Chicago, Ill., entitled, "Building Regulations of Concrete Blocks." We hope to have this paper appear in these columns later, as it gives an idea of the stringent building laws regarding the use of concrete blocks for building purposes in the larger cities where it seems at present much prejudice is to be overcome by the advocates of the building block.

AFTERNOON SESSION, JANUARY 11th.

The paper by Professor S. B. Newberry, cement engineer, of Sandusky, Ohio. This paper entitled, "The Manufacture of Hollow Concrete Blocks," is thoroughly up-to-date in every particular, and the interest of the delegates was evinced by the rapid succession of inquiries which Mr. Newberry very graciously answered in turn. It will be printed in an early issue.

THE CAUSES OF FAILURE IN THE CONCRETE BLOCK BUSINESS.

BY O. U. MIRACLE.

Mr. President and gentlemen of the National Cement Users Convention: It certainly would be presumptuous on my part to assume to tell you all the causes of failure or lack of success in the concrete block industry. Many theories may be found inefficient when put to practical tests, so I shall only treat the subject in the light of my own observations in the field, and shall point out the most glaring dangers which seem to confront us, in order that we may suggest remedies to overcome them.

In most all estimates of cost of manufacture, I find that account has been taken only of the direct expense, no mention whatever being made of indirect expense, such as advertising, superintendence, interest on the investment, depreciation, loss from breakage, bad accounts, etc. This is by no means "a get-rich-quick" scheme, but one of the best paying and most legitimate propositions before the investing public to-day, notwithstanding the fact that some of the literature in circulation is painfully strong in having that "get-rich-quick" ring to it. There is sufficient profit in the business to place it on a much higher plane than has been aimed at by many manufacturers. The facts of the matter are, including all these extra items of expenses, there is still more chance for gain in this business than in the manufacture or production of any other building material of equal strength and lasting qualities. Up to the present time we have been very lame in the lack of standard specifications for the manufacture of this product. In order to get this matter on a uniform basis, it was brought up at the meeting of the cement block manufacturers, held in Chicago last June, and as chairman of the committee appointed for this purpose, I hope to have the pleasure of submitting a progress report, at an early date, and the same will be given due publicity.

While we are on this part of the subject, it may be well to call attention to the fact, that the machinery manufacturers are not alone to blame for the placing upon the market of poor material. Many who have engaged in this business have made very serious mistakes—mistakes which are expensive, but which can be overcome. Within the past week a case has been brought to my notice, where the party failed absolutely, and his machinery, plant, stock, etc., are now in the hands of the sheriff. This man made serious mistakes and many of them. In the first place he did not attempt to secure any business on merit; he had the idea that he must always be below his competitors to get orders. If the other fellow's figures on a certain job were five hundred or a thousand dollars, he would invariably bid 10 to 25 per cent lower on the jobs he secured.

Under these conditions, what could you expect but inferior material and poor workmanship—in the end a botch job, and worst of all, a dissatisfied customer, who uses his influence against cement work at every opportunity.

It therefore comes to us most forcibly, that you who are furnishing this product to the public, must get together on a basis that will insure a uniform product of no uncertain quality, and it

will then command the price of which it is worthy. So much for the moral failure.

Then we have the man who goes into business with insufficient capital. Some manufacturer has sold him a machine or partial equipment, simply because he had the price, or a part of it; he gets credit of his local dealer to the extent of the price of a few barrels of cement at a good round price. He makes a few blocks and sells them while they are yet too green for use, in order to get funds for his pressing needs. He discovers on account of his men being new in the business, or for some other reason, that the blocks cost him much more than he anticipated, or twice as much as the over-ambitious salesman told him they would. He is short on profits and has already established a selling price at too low a figure. The tendency then is to attempt to make a profit at the already established price by cutting down the amount of cement used and correspondingly increasing the amount of sand. The results are too well known. He is down and out in a short time—condemns the business in general, and the machine in particular that he bought and is not slow to discourage others. By the time the report of his failure gets into about the third or fourth hands, the conditions responsible for the results are lost sight of, and the report is spread broadcast, that the business is a fizzle.

Next we come to the architect. He occupies a very important relative position in this matter, and his adverse criticism, has no doubt proven a stumbling block to many of you. The value of his opinion and indorsement, have been too lightly estimated by many. His position has of necessity, been one of great care and caution. He is not willing to depart from fields of well known practice for the mere novelty of an experiment. His position must be secure—in other words, "he is from Missouri and has to be shown," but he has been a careful student of the concrete block, and where a year or two years ago, he turned a deaf ear to the proposition, he has discovered now that the material is already established, and he is willing to consider it for his requirements.

I have visited many yards where the owners were making less than half the designs and sizes of block their outfit was capable of turning out. While it is true, there has been a demand for this rock face block, which you all make, I hope the time will soon come when you will get away from this idea entirely. It is at best but an imitation. As I have said on other occasions, I believe this material is entitled to a distinct classification of its own, and a building made of it, should be designated as a concrete building, and not as artificial stone, as so many call it.

One of the handsomest buildings I have ever seen of concrete, was made of all plain face blocks for the body of the building, with bevel coigns at the corners and openings, with a few ornamental designs utilized as belt course and cornice.

Another just objection of the architect, is the extreme porosity, or lack of impermeability of many blocks. This combined with the strength of the material, is the all important part of this proposition, and these objections are being rapidly overcome. This comes properly under the subject of manufacture and specification, and I shall only touch lightly upon it, as so important a subject is worthy of more lengthy consideration. The results obtained in this direction depend upon the following five vital points.

First—Proper selection and proportioning of materials.

Second—Careful mixing and complete incorporation of the ingredients.

Third—Careful and thorough tamping.

Fourth—Care in curing.

Fifth—Care in laying.

Proper Selection and Proportioning of Materials.

Under the subject naturally come the selection of the cement, sand and aggregates. The cement should in all cases be a first class Portland, guaranteed to stand the tests required by the specifications for Portland cement, adopted by the American Society for Testing Materials. In the selection of sand and aggregates, the greatest care should also be exercised. I maintain that sand should be practically free from clay, loam or other soluble matter; notwithstanding the fact that many tests have shown that a small proportion of clay is not harmful. I believe it to be a very dangerous practice, to recommend the use of sand containing any perceptible amount of clay, from the fact that the average worker has no facilities for determining the percentage found in his material. If possible the sand should be graded in sizes, so as to reduce the voids to the smallest possible

amount. The percentage of cement used with the sand should be such as to perfectly fill these voids. For determining the voids, the water test may be employed without laboratory facilities.

Average sand is found to contain 25 to 35 per cent voids, indicating the necessity of using this percentage of cement to make a perfect sand cement mortar.

Where aggregates are employed, the voids in the aggregate may be determined in the same manner as they are in the sand, and an amount of the sand and cement mixture equal to the amount of voids in the aggregate, should be used to make a perfect stone.

Careful Mixing and Complete Incorporation in the Ingredients

Machine mixing is at all times preferable and invariably produces a better concrete by at least 10 to 15 per cent, than can be made by hand mixing. The materials should be thoroughly incorporated and mixed, until of uniform color.

When an aggregate is used, the sand and cement should be well mixed first, then the aggregates and water may be added at the same time.

I believe that with any of the machines now on the market, a much wetter mixture can be used than is generally employed, if proper care is taken of the face plates. The face plates should be kept clean with a wire brush, and be given a coat of oil or shellac as frequently as once a day.

Careful and Thorough Tamping.

The tamping should commence with the placing of the first shovel full of material in the mould, and should continue until the mould box is full. A small face tamper should be used, and quick, sharp blows should be struck.

Many unsightly buildings have been put up of blocks which showed unevenness in their texture, on account of careless and uneven tamping.

Care in Curing.

No part of the manufacture of concrete blocks is more important than the curing, and I regret to say that this essential part of the manufacture is altogether too frequently disregarded.

Blocks should be kept moist for at least seven days after making. The water should be applied with a spray or sprinkler immediately after the initial set has taken place, or as soon as it can be applied without washing the stone.

Another fault that I have discovered in this connection, is the fact that many yards do not carry sufficient stocks of blocks on hand—they wait until they have secured the contract before making the stone, and they are in this case rushed into the building, too green, and bad results will inevitably follow.

No concrete stone made in the manner above described, should be laid in the wall, until it is at least 30 days of age.

Green blocks should never be exposed to the rays of the sun or warm currents of air, during the first seven days when they are supposed to be kept moist.

I have seen in the early stages of this business, blocks made under an open shed, immediately placed out on a hillside, exposed to the sun and wind, with no water applied, except such as was pumped with a common wooden pump and carried in buckets, and you all know too well the results that come from this careless and hap-hazard method.

Is it any wonder that blocks made in this manner are porous, or that they absorb moisture readily?

Many of you have seen buildings of concrete blocks, which showed bad cracks in the wall. A building of this material requires just as solid a foundation, as though built of any other substance, but in nine cases out of ten, where I have found cracked buildings, I have found this result came from laying the blocks in the wall too green. They must have at least thirty days in which to cure, and they are better if they are sixty days, or even six months old.

Care in Laying.

Too great stress can not be put upon this important part of the business. A mortar of equal parts of lime and cement to two or three parts of sand, should be used, and all blocks carefully bedded and buttered on the ends, and the joints well pointed up. This pointing should be done at the time of the laying, as if done at some later period the blocks are apt to absorb the moisture from the mortar, thereby loosening it, so that it will drop out.

Summing up, we find that we have arrived at a very vital and important point in the progress and development of this business—we have arrived at the "parting of the ways."

There will be two distinct classes of this material, viz: good and bad; the latter coming from those lacking experience and knowledge of the business, and let us use our united efforts to set them right.

If you have a new competitor in your town go to him, and tell him how to make good work, assist him in getting started right, and it will invariably assist in bringing about a uniform and superior quality of concrete blocks and result in better profits for both.

There will always be some failures, as there are failures in any business, but by united effort and care, we can reduce these failures to a minimum, and early establish this material in the high class to which it belongs, and our troubles will be reduced to a minimum.

Mr. M. S. Daniels, of New York, the newly elected vice president of the section on Concrete Blocks and Cement Products took occasion at this time to offer a very valuable suggestion for the benefit of the blockmakers of the association. He suggests establishing a question box bureau of information in connection with this section so that any block man of the association may acquire any pertinent information he may wish. The proper address of such a bureau will be announced in the proceedings of the convention, or in a letter from the secretary at a future period.

An exceedingly instructive paper which excited most favorable comment upon the part of all members who heard the reading was that of Mr. Richard K. Meade, chemical engineer, of Nazareth, Pa., on "The Choice of Cement for Concrete Blocks." Mr. Meade, as it will be seen from his paper which we print here, dealt with this subject on a highly scientific basis and there is no doubt that the paper was one of the most important educational features of the convention.

THE SELECTION OF PORTLAND CEMENT FOR THE MANUFACTURE OF CONCRETE BLOCKS.

BY RICHARD K. MEADE.

A general impression seems to prevail that sand is of many grades and must be carefully selected to give a block of good color and the requisite strength. Likewise, that each make of concrete block machine possesses features peculiar to itself which will add to the economy with which the factory can be run or the quality of its output. Portland cement, however, is thought to be Portland cement, and like Caesar's wife, to be beyond reproach.

One brand is often considered as good as the other and the whole matter of selection often turns on a difference in price of a few cents a barrel. A sales agent for a large cement plant recently said to me, "My friend, there is no such thing as bad Portland cement," which was another way of saying that "there is a sucker born every minute," and, if a cement is not good enough for the careful purchaser who tests his purchase, it can readily be worked off on the careless man who does not.

The concrete block manufacturer needs the best of cement, and the future of his business will depend upon his getting this. If he allows his warehouse to become the dumping ground for cement rejected for such heavy rough undertakings, as piers, abutments, foundations, etc., how can he expect the finer and more exacting class of work which he does to last.

It is the purpose of this paper to point out the properties most requisite in Portland cement to be used for the manufacture of concrete blocks. Three all-important qualities of the latter will be dependent upon the cement of which they are made; two of them will be entirely dependent upon it and the third to some extent. These properties are:

- (1) Endurance.
- (2) Strength.
- (3) Color.

The endurance of the block is of course an important property as it makes little difference what strength the building may have when made, if in a short time it is to disintegrate. The strength of the block, however, should be such that it will withstand all stresses, strains and loads which may be applied to it, either in the laying of it in the wall or after it is in position and the building completed. The color of the block affects its marketability for super-structure work.

To take up the way of attaining these qualities in detail, we will first turn our attention to Endurance.

Endurance.

To manufacture concrete blocks which will last and which will retain their strength in spite of the disintegrating action of time, water and gases of

the atmosphere, a "volume constant" or "sound" Portland cement must be used. What causes certain cements to swell and expand after mixing with water and allowing them to harden is not certainly known. These conditions surrounding the manufacture of cement which give it this tendency are well understood, however, and are usually improper proportions of the raw material (allowing the lime to be in excess over the silica and alumina) and insufficient grinding and burning of the mixture. This has led most cement investigators to attribute disintegration to an excess of "free lime." This free lime is locked up in a case of hard cement clinker and is almost as effectually protected from water when the cement is made into concrete as if it were sealed up in a bottle. In time, however, the hard protecting case of clinker is itself acted upon by the moisture of the atmosphere, etc., and becomes hydrated. The water then has a chance to get at the free or loosely combined lime, and this in hydrating or combining with the water, expands with great force and disintegrates the now fully hardened concrete, just as water freezing in an enclosed vessel will burst the container no matter what its strength may be. This is the most common explanation of the "blowing" or expanding of unsound cement, but be the reason what it may, it is a fact that such Portland cement sometimes expands to such an extent after hardening that the expansion may even be measured, and blocks of concrete made from such cement will sooner or later fall to pieces and disintegrate.

Certain brands are much more liable to this tendency than others. Some mills are provided with insufficient grinding machinery for the raw materials and, hence, can seldom make a cement which is sound when fresh. These depend on seasoning to make their product sound, and hence, when pushed for orders, are very apt to ship fresh, and consequently, for them, unsound cement. Lack of knowledge, or of skill in manufacture, or of system in supervising the process often are the causes of unsound cement. It is probably easier to make a sound cement from cement rock alone than from any other material, and next to this comes the cement-rock-limestone mixture, the difficulty with this growing greater as the percentage of limestone in the mixture increases. It usually costs less to make an unsound cement than a sound one, because less care is needed in proportioning the raw materials, less grinding is necessary to prepare them for the kilns and less coal may be employed in burning them. Consequently, the block manufacturer should exercise care in purchasing cement to make sure he does not secure cheaply or carelessly made and often unsound cement. If he does secure such a cement, the result will be this: his blocks when freshly made and after "curing" will be sound and hard, and will present no sign of the dissolution, which may ultimately take place with them. They will go out and be laid in the wall of the house. In time, possibly in a year, may be more, the face of the blocks will begin to crumble and strip off the block; cracks will appear in it and, if the cement was very much unsound, the block will eventually crumble away. This is no exaggeration. I have seen briquettes made of three parts sand and one of unsound Portland cement, the proportions often used in block manufacture, which, when hardened for a week, stood a tensile strength of over 350 pounds to the square inch, but which in less than a year had fallen to a powder in which almost every grain of sand was separate and distinct and the cementing agency which had at one time bound them together was merely a mass of light brown powder.

Unsound cement is by no means a rare occurrence either, and there are manufacturers who believe "no cement is bad" and ship fresh from their grinding mills any old thing they happen to be making, whether it passes the standard "soundness" test or not. The cement inspector of a large corporation recently told me that 90 per cent of the cement offered his concern by a certain manufacturer was rejected because of its failure to pass the soundness tests. Are you certain that you did not get any of this cement? I know that cement tests are expensive, yet I know of no better safeguard against unsound cement than the laboratory test. The next best thing is confidence in the knowledge, skill, care and good faith of the manufacturer himself. The concrete block made of unsound cement differs in no way perceptible to the senses from those made of sound. It may not disintegrate for years, it may indeed for that matter never disintegrate, but the chances are that the blocks made of unsound cement will sooner or later crack and crumble, and the concrete block industry in the sections in which this does occur will very likely receive a serious setback thereby.

It is now generally recognized that seasoned cement is much better than fresh. My own experiments indicate that cement seasoned in bulk for about six months is at its best. Cement which has been kept in bags this length of time unless stored in a dry place, may lump, and consequently the block manufacturer may have some trouble making a good sand mixture. There is much to be said in favor of the block manufacturer's buying his cement in large quantities and storing the same for some months. By doing this he will be much less likely to use unsound cement, since unsound cement is often cured or made sound by seasoning. The cement will also gain some in strength. Two objections to storage are the liability of the cement to lump or cake, and possibly in some cases to its coming to quick setting. The latter tendency is usually met with in low limed and poorly manufactured cements, though under certain conditions all cements seem liable to become quicker setting with seasoning.

It is a well known fact to those versed in the technology of Portland cement manufacture that the addition of plaster of paris to unsound cement often makes it pass the standard steam test; and that some manufacturers make a practice of so "doctoring" unsound cement. The addition, however, is harmful to cement, as an excess of plaster not only causes the concrete to weaken in time but also causes unsightly white streaks and efflorescence on concrete blocks. The unsoundness caused by plaster can only be detected by long time tests, so that the usual plan of guarding against it is by limiting the amount of sulphur trioxide found in the cement to 1.75 per cent. Since this is the active constituent in plaster of paris, by determining the amount present (as can readily be done by a chemical analysis) we can calculate if a harmful percentage of plaster has been added to the cement.

While not strictly falling under the title of this paper, it may be well here to mention some causes of unsoundness in concrete blocks which are not due to the quality of the Portland cement itself, but to qualities which are developed in it by the use of certain chemicals, etc., added to facilitate manufacture or give color.

The demand for a quick setting cement has brought into use the carbonate and hydroxides of potash and soda. These chemicals are the base of nearly all the quick hardeners sold to the concrete block manufacturers. They cause unsoundness to a marked degree and should not be used except upon the advice of an expert cement chemist. They also cause efflorescence on the block. Some care should also be used to guard against coloring matters for the blocks which contain chemicals, such as the sulphides or sulphates, chromates, acetates, etc., likely to react with the cement to the damage of the block. Most sulphides are readily oxidized to sulphates, which change is accompanied by expansion and consequently disintegration of the block. Pure oxide colors are the best and can be used with safety.

Sands with a large percentage of soda and potash minerals (such as mica) or containing pyrites (iron sulphide) are also objectionable for the reasons given above.

Strength.

The strength which Portland cement may develop is due to various conditions of its manufacture, such as chemical composition, thoroughness of burning, and fineness to which it is ground. As cement is always used with sand, no attention need be paid to its neat strength, unless blocks are to be faced with very rich mixtures. Neat strength is very deceptive and is seldom a reliable indication of sand strength.

One of the most important qualities of Portland cement is determining the strength of the concrete made from it is the fineness to which it is ground. Other things being equal, the finer the cement the greater will be the strength of concrete. Thus, a cement as ground by the manufacturer so that 95 per cent of it would pass a 100 mesh sieve, gave a sand strength of 267 pounds in 7 days, while the same cement ground to all pass a 200 mesh sieve, gave 375 pounds for the same period, or an increase of 40 per cent in sand strength due to finer grinding.

In this connection it may be said that fine grinding seldom increased the neat test any, and indeed, as a general thing lowers this, so that high neat tests, when given without the sand tests, may be regarded as meaningless.

The particles of cement retained in a 200 mesh sieve are entirely inert and may be looked upon as just as much aggregate. If these particles are sieved out and the attempt is made to make a block

of them it will be found impossible to get the mass to cohere. Exactly how small the cement particles must be before they will be acted upon by water no one has yet determined, but it is known that of the material passing a 200 mesh sieve some of it at least is not fine enough. This has an important bearing on the value of the tests for fineness. For example, a cement, all of which is ground just sufficiently fine to pass a No. 200 sieve is not in reality so fine as a cement ground in such a way that while some of it fails to pass a 200 mesh sieve, still the greater part of that which does is a more or less impalpable powder. Similarly cement ground 85 and 95 per cent through the 200 mesh sieve by rolls and other *non-flouring* methods of grinding is not really as fine as cement ground 75 per cent fine by other methods.

Since the particles of cement retained on a No. 200 sieve are inert, the purchaser may look upon all of such coarse material as so much waste matter whose place can be taken by sand without detriment to the resulting concrete.

Probably all concrete block manufacturers are striving for a waterproof block, one in which all the voids are filled. This latter may be achieved by the use of a richer mixture, by waterproofing compounds, or preferably by the employment of a sand containing the proper proportion of fine particles. These fine particles help to fill the interstices between the coarse ones and to so keep out the water. One of the oldest principles of good concrete is "to coat the particles of sand with the cement paste" and that the strength of the concrete is proportionate to the thoroughness with which this has been done. Now the finer a body is pulverized, the more surface it will present. Thus, if we divide a cube an inch square into halves, we will increase the surface area from 6 to 8 square ins., if we quarter it we will increase to 10 square inches, etc., consequently the finer the sand we use, the more surface there will be to coat and for exactly the same reason the finer must the cement be to coat this sand.

The setting time of Portland cement also has an important influence on the strength. Slow setting cements, that is cements which get their final set in from 4 to 9 hours, are much stronger than those which set more quickly. Quick setting cements are nearly always over-clayed and contain less of the active silicate and aluminate of lime, to which cement owes its strength, than the slower setting ones. This may seem paradoxical but it is nevertheless true. The compounds in cement which set quickly are not those which give it great strength, consequently cements giving an initial set of less than 30 minutes are hardly ever as strong as those which require 2 or 3 hours. For example, a cement which sets in 30 minutes rarely ever, unless very finely ground, gives a 7-day sand test of over 250 pounds, while one with a set of 2 or three hours may easily give 300 to 350 pounds, or even more. Cements with a "flash" set, that is which set up under the trowel, should not be used in making blocks as these latter are apt to be weak. With such cements the set is broken by working, the processes of solution and crystallization are interfered with, and consequently the cement has only half a chance to do its work. The set of the cement should always be sufficient to give ample time to mix the mortar and fill the machine, or molds.

One of the greatest requisites for Portland cement to be used for concrete blocks is that it shall be a quick hardener. It must get its strength promptly. By prompt hardening is not meant quick setting cement. The term set is merely used to define the change undergone by the mortar in passing from the plastic to the solid state. The hardening only beginning after the setting process is completed and quick setting cements are not necessarily prompt hardeners.

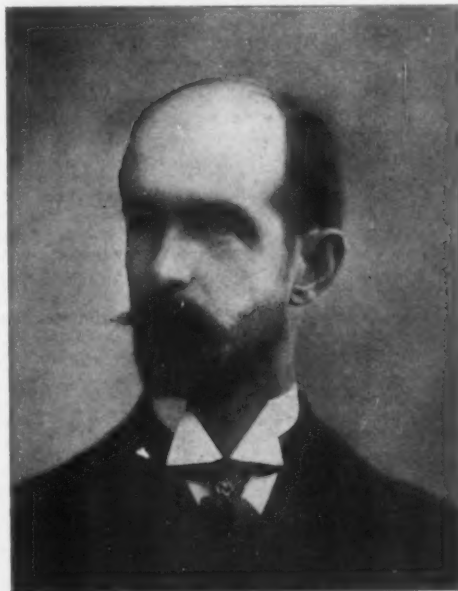
The best test for prompt hardening is the seven day sand strength. Cements which get a tensile strength of 300 to 350 pounds per square inch in 7 days are now on the market and these are best suited to concrete block manufacture. No attention need be paid to increase strength. If the blocks do not lose strength the sooner they get their full strength the better, because the sooner they can be used and the less time is needed to cure them. A cement which has a sand strength of 350 lbs. after 7 days, and which has only increased 50 pounds in a year is to my mind much better than one which has a strength of 200 lbs. at seven days and increases 150 pounds in the same length of time, because it will stand the same stress seven days after making that the other one will after it is a year old. A building may

have to stand its full load three months after the blocks are made, and hence the prompt hardening cements are needed for blocks manufacturing.

Below is an example of the two classes of cements, prompt hardeners and those with what their manufacturers point to as a progressive increase.

	7 Days	28 Days	3 Mos.	6 Mos.	1 Yr.	2 Yrs.
Prompt Hardener	375	882	380	395	415	415
Progressive Hardener	212	275	282	312	350	396

Cements made in the old fashioned upright kilns are all slow hardeners, while the higher lime rotary kiln cements are usually prompt hardeners. Upon the introduction of the rotary kiln in this country, about 1890, those who still used the upright kilns in America and the German manufacturer who used them exclusively and who also, at that time, imported largely into this country, used this argument continually to keep the rotary cements out of the market—that Portland cement should show a slow progressive gain for a period of ten years or more. It is interesting in this connection to remark that the German scientists must now be satisfied that prompt hardening cements are all right since they are rapidly replacing their upright kilns by rotary kilns, and some of their leading scientists have become the champions of high-lime, prompt hardening cements.



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A prompt hardening cement and a slow hardening cement can be made from the same batch of clinker, as the burned unground cement is called, by grinding one lot coarse and the other fine. If the coarsely ground is "volume constant" or "sound" it will usually give a cement which gives low tests at first and finally fairly high ones. The finely ground cement on the other hand will give tests which are usually high at first and increase very little comparatively with time. This shows that slow hardeners are merely Portland cements with more or less slowly acted upon material in their make up. This material may be coarse particles of cement or material of feeble hydraulic properties which only begins to hydrate after a long period in water. Portland cement can also be made slow hardening by additions to it of such substances as ground slag, limestone, cement-rock, rosendale or natural cement, etc.

All rotary cements are not prompt hardeners as chemical composition, as well as methods of burning influence this. Prompt hardening cements usually cost slightly more to make than slow hardeners, as they usually contain a higher percentage of lime. This necessitates finer grinding of the raw materials and harder burning to make a sound cement.

Unsound cements give high short time tests which fall off remarkably with time until ultimately the briquettes may fall to pieces of their own accord. Prompt hardening cements often give neat

tests which are high at seven days and fall off somewhat after a period. The old theory was that this showed interval agencies at work disrupting the briquettes, but it is now generally accepted that if the cement is sound, falling off in strength of neat briquettes is due almost entirely to the fact that as the cement hardens it becomes brittle and more easily broken by the sudden torsional strains, etc., to which the briquettes are subjected in testing. Sand tests, both tensile and compressive, made of the same cement seldom show any marked falling off and hence since cement is always used with sand and in compression or abrasion, no attention need be paid to the brittleness of the neat briquettes. Where, however, blocks are to be faced with rich mixtures such as one of cement to one and two of sand, some attention may be given to neat tests also, or better still special briquettes may be made using the proportions to be employed in facing the block. If the latter can not be done, cements giving good neat test should be employed and since unsound cements are most apt to give trouble in rich mortars than in lean, for the reason explained before, only well seasoned cement should be used.

Concrete blocks are now sometimes waterproofed by coating their exposed surface with a thin layer of paraffin. This thin layer effectually protects the interior of the block from the moisture of the air, and as cement can only harden by hydration (absorption of water) the block can not gain in strength after it is so coated. Consequently where waterproof blocks are made, prompt hardening cements should always be used, and the block should be allowed to gain good strength before applying the coating. For a similar reason these blocks should not be made too dry.

In connection with the use of waxes, etc., for waterproofing it may be well to state that certain waxes and fats are very likely to decompose in time with the formation of "fatty acids." These acids attack the concrete by dissolving out the binding agent, hydrate of lime, from between the sand grains. Pure paraffin, however, does not decompose into fatty acids but some animal fats and vegetable waxes are very likely to do so.

Colors.

The concrete block manufacturers will probably be more interested in the color of his blocks than in any other one of their properties, since upon this will depend the immediate marketing of his product. Uniformity of color is, therefore, very important to him since the color of a building, in order to be pleasing, should present a uniform appearance to the eye. Uniformity can only be secured by making the block of uniform cement and sand, mixed in definite proportions and manufactured into blocks under as nearly the same conditions as it is possible to obtain. For colored blocks dark colored cements may be used, but their color should be uniform. For lighter blocks, light colored cements must be used. As the color of cement gets lighter as it is ground finer, only finely ground cements should be used for this work. The percentage of iron and manganese in the cement also influences the color. Cements free from manganese will be white and the color darkens as the percentage of iron and manganese increases. Most cements are practically free from manganese, and hence the color is usually due to iron.

Sulphate of lime, which is always added to cement to regulate the set, is one of the causes of the white efflorescence seen on concrete blocks. This salt is soluble and is carried to the surface of the block by the water which "sweats" out during curing. The less sulphate of lime present in cement intended for concrete block manufacture, the better. As Portland cement can be obtained which contains less than 1.5 per cent. sulphuric anhydride (the chief constituent of the sulphate) and the way they are usually reported in a chemical analysis) it is hard to see why cement containing more than this amount should be used.

The alkalis are also soluble salts and are to some extent responsible for the saline efflorescence on concrete. Cements low in these should, therefore, be used. Most American Portland cements, however contain less than one per cent. alkalis.

Sulphides of iron are sometimes met with in cements burned in upright kilns. This causes dirty brown splotches to appear in the work from the oxidation of the iron to brown oxide of iron or "rust." Overclayed cements also show the same dirty brown color throughout the mass, as in such cements the iron seems to be present as the red brown "sesquioxide" instead of the black "magnetic" oxide of well made cements.

The name of Mr. E. S. Larned, the wellknown civil engineer, of Boston, Mass., who is also chief inspecting engineer for his city, appeared on the program for Friday morning, but owing to the necessity of his departure for Boston, his paper on "Observations on the Testing and Use of Portland and Natural Cements," concluded the program for this afternoon. This paper, so well prepared and accompanied by stereopticon pictures of his painstaking tests and tireless efforts in the study of his question, is entitled to unlimited praise, and necessarily made a great impression upon the convention.

OBSERVATIONS ON THE TESTING AND USE OF PORTLAND AND NATURAL CEMENTS.

BY E. S. LARNED, C. E.

The present remarkable development in the use of cement is the direct outcome of the careful and persistent observations and experiments of our engineers, mechanical, chemical and civil. There is not a structure of modern times built of natural stone or forms of burned clay that has not been duplicated in cement, and the latter is now meeting structural requirements hitherto impossible except by the use of iron, steel and timber, and its advantage over the latter materials in the matter of cost, durability and freedom from injury by fire and water is only just coming to be known. Time has shown that when cement is carefully selected and treated intelligently in the practical work of construction, enduring monuments are founded to the honor and credit not alone of the designer and builder, but, in justice, be it said, to the pioneers and courageous supporters of this important industry in our country, who have persevered in face of many discouraging and adverse conditions until the American product is recognized as standard the world over.

While the rapid growth of the Portland cement industry since 1895, and the extended use of the material in all forms of construction, may well be taken as a tribute to its improvement and reliability, the better understanding and appreciation of not only the users but of the engineers and architects as well, must also be considered of the utmost importance. Hydraulic cements have been made and used for more than a century, and yet it has remained for investigators of comparatively recent years to throw much light upon the subject, and the light must be disseminated widely before the full benefit will be derived.

The adoption of a standard specification for Portland and natural cements, during 1904, by the joint committee of the American Society of Civil Engineers and the American Society for Testing Materials has proved a happy issue out of the maze of conflicting requirements the manufacturer has met with throughout the country in years past. It was perfectly natural, under such conditions, that doubt and suspicion, of a product so little known, should prevail among the uninformed, and the American manufacturer of Portland cement, the agent for foreign cement as well, was often regarded as a necromancer when he was enabled, through his superior knowledge and experience, to demonstrate that a cement in question was all right for use. Before the adoption of the standard specification (and even to-day to some extent), much conflict of opinion was found upon some of the most vital principles governing the acceptance of cement, each tester or engineer performing this duty was a law unto himself, and exercised the full prerogatives of his official position in fixing requirements and interpreting results, often times prescribing tests that were misleading and fallacious as an indication of quality and only served to vex and hamper the manufacturer, and in such cases an effectual barrier was set up between the very interests that have since combined and co-operated to the great benefit of all concerned.

In the absence of better information, it may be natural for the user of cement to entertain with suspicion the statements of the manufacturer affecting the quality of a cement in question, but it seems obvious that with standard specifications and uniform methods of testing, combined with full and up-to-date information upon the results of the several determinations made, there would follow greater uniformity in the material, less opportunity for dispute and a greater degree of confidence and mutual respect between men who are seeking the same attainments—excellence of material, design and workmanship, and in all projects that mark the prosperity and progress of our country.

With an experience covering nearly eighteen years, upon important hydraulic construction, I have found opportunity to observe many variable conditions affecting the requirements and use of

cement, and I know of no material entering into construction of which so much is expected, that is subjected to the same or equal abuses, and when a failure is recorded, happily very few, how common it is to see the cause ascribed to the cement.

An idea will obtain in the classroom, office or laboratory that, if carried out or closely approximated in the field, would give excellent results, but how often this is forgotten or overlooked, and crude, yes, cruel, methods of work be suffered, and this can, under some conditions, be said even of cement-testing. Young men are sometimes selected for this work without previous experience or any knowledge whatever of the subject, and though one may have a high degree of intelligence, and be industrious and conscientious in his work, under good or indifferent supervision, yet the best that can be said of such a selection is that he is more likely to cause a good cement to be questioned than to pass a poor one, although the latter chance is not remote; meanwhile, little consideration is shown the manufacturer or the reputation of his product.

Once asked to explain the difference in results obtained by two testers working together, using the same amount of water in mixing and following the same method of moulding, etc., I offered the somewhat parallel case of two cooks making bread from the same barrel of flour, same yeast, and same formula throughout, and yet the quality and appearance of the loaves would be quite unlike.

The personal equation, perhaps, may not be removed in testing cement, but other conditions that vitally affect the results can be brought to a more uniform basis, and these in ordinary practice may briefly be summed up as the quantity of water used to produce a paste or mortar of given consistency, time and manner of manipulation, method of moulding, temperature of water and air, time and conditions of exposure in air and water, and rate of applying the load.

When tests are made under the instructions of the standard specification by an experienced and skilled operator, they form a record valuable not alone to work, in which the material is being used, but to all users of cement who may have access to the results. Uniform tests, under a standard specification, serve to show:

First—Whether the material meets the standard or fixed requirements.

Second—Uniformity of the product tested.

Third—A comparison with other brands of the same material, which is invaluable at times when making a selection and computing the real relative net values.

Without a uniform specification and uniform tests thereunder, it is obvious that results could give no indication of uniformity of product, and a comparison with other brands or of the same brand tested at other points would be meaningless to a great extent. Training and experience are regarded as essential in any technical, mechanical or professional work to produce results that are scientific, accurate and dependable, the operator must know the full significance of his determinations or he will at times omit some detail or overlook a precautionary measure that may have a marked effect upon his results. Only trained, experienced men should be entrusted with the testing of cement on important public or private work where results are carefully tabulated and published in reports or otherwise circulated, and it is of great benefit and interest to all users of cement that we may have such results to refer to. The small or casual user of cement hardly finds it expedient or necessary to attempt a chemical analysis or test for specific gravity; in fact, when he is using a well known and established brand he need feel little concern about this, and the tests for soundness, sand carrying capacity (which he determines by tensile tests of sand mortars), time of setting and fineness, altogether have a bearing on the chemical proportions and specific gravity that means much to the experienced observer.

Tensile tests of neat cement are useless in determining the real relative strength of one or several brands of cement, and the proportion of 1 cement to 3 sand, by weight, should alone be considered in making comparisons. We use the cement with sand, not neat, consequently we want to know what to expect in our work. Many cements, both Portland and natural, give very satisfactory results in the neat test, but show marked inferiority compared with the best brands of both grades when tested for their sand carrying capacity. Unless the standard Ottawa sand or crushed quartz be used throughout the test we must recognize the fact that variable results will follow that are not due to the cement.

The effect of water in retarding the induration of cements and reducing their tensile strength, particularly at short periods, has long been known, and more or less information has been published as the result of experiments made.

The writer was led to make a series of tests on these lines during 1901, in somewhat more detail than anything he had seen published, and it is the result of this experiment that we will now consider. It may be stated that one man made the briquettes for the entire series, six for each period, at each interval in the amount of water used; the water in mixing was at a uniform temperature of 63 degrees F., and the temperature of the air averaged slightly under 70 degrees F., and fluctuated between 50 and 75 degrees F. Two briquettes of A. S. C. E. standard form were gaged at a time, and beginning with the dry mixtures the molds were filled in three layers, each rammed successively until flushed, by hand, using a hard-wood pestle, and finally struck off and smoothed with a trowel. The ramming process continued until the mixtures became too soft, when the molds were filled by pressing in with the thumb and troweling. So far as possible, the briquettes were allowed to set in air, under a damp cloth, about two hours after taking the heavy wire before immersion; this could not be followed uniformly, and some of the softer mixtures were allowed to set in air overnight, and in a few instances the operator was obliged to wait late in the night to complete his observations. In determining the rate of setting the Gilmore needles were used, and care was observed to use the same sample of cement throughout the series, and this was taken from the storehouse of contractors engaged in the construction of a large public work. The decimal scale of weights was used in gauging, the graduate glasses being carefully calibrated to agree, and the briquettes were broken on a Fairbanks machine of late pattern, the clips having roller bearings of composition metal.

Chemical analyses of the cements here considered were not made for this test, but the characteristics of the brands named are perhaps well known to many, and will be only briefly referred to. The Atlas and Giant brands of Portland cement both come from the Lehigh district of Pennsylvania, and, in their chemical composition, are in quite close agreement. The "Union" natural is also made from the crystalline cement rock of the Lehigh district, is light in color, and its composition is quite unlike the "Hoffman," which is dark in color, being made from the magnesian limestone of the Rosendale district, New York. "Union" more closely approaches the Portland Standard in composition and differs from the Hoffman noticeably in its lime and magnesia content, having about 50 per cent lime and 2 per cent magnesia, while the Hoffman has about 36 per cent lime and from 16 to 18 per cent magnesia which is characteristic of about all the New York Rosendale cements. The low magnesian content, together with the very fine grinding of Union, causes it to be more active and quicker setting than Hoffman, and this is well shown in the table and diagram, particularly in the wetter mixtures.

As might be expected, this difference in the cements, tested neat, would be in greater contrast when combined with sand in concrete mixtures, and it was, in fact, the dissimilar results in practical work of construction that led to this experiment, and I regret that the experiment did not also include mortar mixtures, in the proportion of two sand to one cement, in the Natural cement, and three sand to one cement for the Portland, wherein conditions would obtain more closely approximating the operations of every day practice.

From personal acquaintance with a recent large work of concrete construction the writer is forced to the conclusion that when any reliance must be placed upon the cohesive strength of Rosendale cement, within six months, and perhaps longer, depending upon the exposure and local conditions, great care must be exercised in proportioning the amount of water used, or, in the present day of wet concretes, in selecting a cement that successfully withstands the deteriorating influence of an excessive amount of water.

In the diagram of tensile results the dryer mixtures of the Hoffman cement show superiority up to the 28-day period, at which time it is quite marked and uniform; the gain in strength between the 24-hour and 7-day periods appears slow, and grows slower as the amount of water is increased; the improvement between the 7-day and 28-day periods is better, but the rate of gain appears generally in favor of the dryer mixtures; the gain in all mixtures between this and the three months' pe-

TABLE SHOWING TENSILE STRENGTH OF CEMENTS MIXED NEAT WITH DIFFERENT PROPORTIONS OF WATER.

Cement brand.	Water per cent.	Sieve test, residue on.			Wire, minutes.	Tensile strength.					
		No. 10.	No. 100.	No. 100.		14 hours.	7 days.	28 days.	3 months.	6 months.	12 months.
		Light.	Heavy.	Light.		Light.	Heavy.	Light.	Heavy.	Light.	Heavy.
"Giant" Portland.	12	0.15	8.4	23.2	12	200	271	655	875	941	720
	14	0.15	8.4	23.2	12	200	271	655	875	941	720
	16	0.15	8.4	23.2	12	200	271	655	875	941	720
	18	0.15	8.4	23.2	12	200	271	655	875	941	720
"Union" Natural.	12	0.1	4.6	10.2	15	20	212	284	252	311	275
	14	0.1	4.6	10.2	15	20	212	284	252	311	275
	16	0.1	4.6	10.2	15	20	212	284	252	311	275
	18	0.1	4.6	10.2	15	20	212	284	252	311	275
"Atlas" Portland.	12	0.1	7.9	18.0	15	270	360	775	809	1067	102
	14	0.1	7.9	18.0	15	270	360	775	809	1067	102
	16	0.1	7.9	18.0	15	270	360	775	809	1067	102
	18	0.1	7.9	18.0	15	270	360	775	809	1067	102
"Hoffman" Neapolitan.	12	3.3	12.4	21.9	22	59	109	177	271	302	284
	14	3.3	12.4	21.9	22	59	109	177	271	302	284
	16	3.3	12.4	21.9	22	59	109	177	271	302	284
	18	3.3	12.4	21.9	22	59	109	177	271	302	284

REMARKS.—Results shown are the averages of the following series.

riod appears quite uniform, and develops a rapid gain for the wetter mixtures; after the latter period inconsistencies develop, and between six months and one year only the 37 per cent and 39 per cent series show any appreciable gain, and the wettest mixture appears superior at the end of the year, the others generally showing a falling off in strength, for which I can offer no explanation.

In the Union cement series the dry mixtures generally appear superior at the 24-hour and 7-day periods, the rate of gain is quicker and quite uniform; as in the Portland cements, the gain in strength of the wetter mixtures is more rapid between 7 days and 28 days, the wettest mixtures having passed four of the series next below, and all of the series being closer together than at the two earlier periods; at three months only the 23 per cent and 25 per cent series held their superiority, the wetter mixtures rapidly overtaking all others, and being in close agreement, with the exception of the 31 per cent series, which made a slower gain; after this period, peculiarities develop for which no explanation can be offered, but the uniform rate of improvement is noticeable in all instances, and the results at one year are better in each case than at any preceding period, the 23 per cent and 33 per cent series showing a falling off between three months and six months with a good recovery at one year.

In the Portland cement series the rapid and uniform improvement between 24 hours and 7 days is noticeable, but the dryer mixtures generally hold their superiority; this is noticeably uniform in the Atlas cement at all periods; the maximum strength was attained at three months, after which, and up to one year, there appears a steady falling off in strength, but from three months on the dryer mixtures are uniformly better.

The Giant cement also attained its maximum strength at three months, at which period the dryer mixtures also appear uniformly superior with the exception of the 15 per cent series; and judging from the results throughout the test, it would appear that there was not quite enough water used to perfect the crystallization of the cement. The Giant cement also shows a falling off between three months and six months, but a good recovery after this latter period in all but one series, 22 per cent, and the wettest mixture 24 per cent, passed the three series next below at one year, two of them in fact in six months, and between six months and one year it showed a more rapid gain than any of the other series.

The personal equation is apparent in these tests, as in any test of the tensile strength of cements, but every effort was made to secure consistent and uniform results, and I will repeat that one man made the test throughout the entire series for the four cements named.

Cement or concrete construction, with or without steel reinforcement, is coming rapidly into favor, supplanting steel stone, brick and lumber in all forms of construction, and it is but natural that mistakes and failures sometimes attend the efforts of the inexperienced and certain retribution is in store for the dishonest workers, but it is a remarkable tribute to this comparatively new material that so few failures have been recorded

during the phenomenal growth of the industry. In fact, the failures in brick, timber and steel frame structures are more numerous than in concrete construction, and yet all are chargeable to carelessness or dishonesty, let us hope that each will serve as a beacon light to prevent a like calamity in the future.

Low first cost is not necessarily ultimate economy, if concrete did not perform its duty well and stand the test of "time" other materials would surely supersede it. It is of the greatest commercial importance to all in the industry, that quality should be a first consideration, you will know how the slightest imperfection in concrete work is pointed out by hostile interests as a sign of inferiority or failure, and a small crack which would be overlooked in brick work is viewed by the uninformed as a forerunner of sure and sudden collapse. Use only high grade cement, select your sand with care and beware of sand containing loam or clay, clean siliceous sand, ranging from fine to coarse gives the best results, test it in combination with your cement before using. The ballast or coarse aggregate should also be clean, and of varying size in order to reduce the voids to a minimum. Gravel and igneous rocks furnish the best stone for concrete, much better than limestone for fireproof construction. For crushed stone, use a 1/4 inch mesh dust jacket on the sizing screen, you will then have a more uniform product. The amount of dust varies with the size, shape and character of the stone crushed, also depending upon the rate of feed into the crusher, the speed of the crusher and the degree of moisture in the stone. Stone dust, if clean, is better than most any sand, but should be accurately gaged as sand, and more care is required to thoroughly incorporate it with the cement because of the large percentage of fine material contained.

If crushed stone is stored or binned, as in most work requiring reserve stock, a more uniform mixture can be drawn from the bins when using, if the dust be excluded, the latter serves to pack or cement the stone together and alternating loads of coarse and fine will surely result.

In securing quality, thoroughness and care of mixing and placing concrete are of the utmost importance, carelessness in placing will undo the work of mixing.

Proportions of cement, sand and stone will vary, depending upon the work to be done, but it is well to keep in mind:

First—That the stone voids should be a little more than filled with sand, and the sand voids a little more than filled with cement (if strength is desired.)

Second—That the voids in ordinary sand vary from 30 to 42 per cent, so that if leaner proportions than 1 cement to 3 sand be used, the cement will not fill the voids and the mortar will be porous.

Third—Accurate gaging is essential to uniform results.

A word as to consistency or amount of water used:

Wet concrete is the order of the day, and while I believe in using too much rather than too little water, still, in my judgment, much concrete is made too wet, and if in this condition much tamping, spading or forking be done, the coarse aggregate will be driven to the bottom of each layer placed and a very unequal distribution of cement throughout the mass will follow. Except in the presence of very intricate reinforcement the mortar should be of a consistency to easily support the coarse aggregate and admit of light tamping. Excess water serves to undo the work of thorough mixing.

With the view of determining the variability of wet mixtures, the writer made the following test this past year:

Gang molds were placed vertically over each other, eight in all, to represent a layer 8 in. deep, the joints between molds were sealed with a thin layer of a mixture of white wax and tallow to prevent the escape of water. A high grade Portland cement was used in the proportion of 1 cement to three parts of standard Ottawa sand, by weight, gaged with 20 per cent water. Fine annealed wire (32 gauge) was inserted between each mold and when the mixture had partially set these wires were used to cut the gang molds apart, and the operation was satisfactory in producing perfectly formed briquettes. The briquettes were allowed to remain in the molds over night, under a damp cloth, and were then removed and immersed in water until broken.

The consistency of this mortar compares closely with much of the wet concrete now used, dryer

than some I have seen used in large work. When the molds were filled the mixture was churned and worked with a glass rod about 1/4 inch in diameter. The following results are the average of three briquettes, a total of 48 being in the series. No. 1 briquette is from the top layer and No. 8 from the bottom:

Tensile Test of Portland Cement.

Mortar: 1 Cement: 3 Sand.

Gaged with 20 Per Cent Water.

28 Days.	45 Days.
336.50	386.50
288.00	392.00
225.00	354.00
255.00	318.00
222.00	292.00
219.00	289.00
288.00	241.00
303.00	265.00

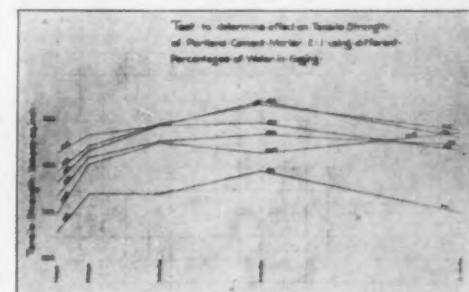
Number of Small Briquettes into which Large Briquette was Cut by passing fine wire between small molds.

The purpose of this experiment would have been accomplished in the test of one period alone, but it was deemed inexpedient to make the trial for any time short of one month. The inferiority of the briquettes in the bottom layers is clearly apparent, there being a maximum loss in strength of 117 pounds at 28 days and 151 pounds at 45 days. This would seem to suggest that the idea is worthy of serious consideration and further experiment, in the line of compression tests also, may bring forth interesting facts.

It would appear entirely reasonable to assume that a greater variation would be found in a seven day test than in either of the above two noted. Concrete, to be of the utmost value, should be a true monolith of uniform strength throughout, this of a vital importance in beam, girder and slab construction and is not difficult of attainment.

This would seem to suggest that the idea is worthy of serious consideration, and further experiment, in the line of compression tests also, may bring forth interesting facts.

Another tabulation is also given showing the tensile strength of Portland cement mortar mixed in the proportion of one cement to two sand and gaged with different percentages of water, ranging from 8 per cent to 20 per cent.



Sand known locally as "Plum Island" sand was used. This is a dredged sand, very clean, selling at \$1.60 per ton delivered. High grade Pennsylvania cement was used. The results given are the average of three briquettes. Percentage of water used was determined on the combined weight of cement and sand. Briquettes were immersed in water until broken after remaining in a moist air closet 24 hours.

The injurious effect of using too little water is plainly evident in the 8 per cent series and requires no further emphasis. Up to six months the superiority of the dryer mixtures, excluding the 8 per cent series, is quite uniform and it would appear that from 12 to 15 per cent water would give the best results in a mortar of this composition, namely 1 cement to 2 sand, 14 per cent water will yield a very plastic mortar if properly tempered.

Portland Cement Mortar—1 Cement to 2 Sand.

Tensile Strength, pounds per sq. inch.

Water—per cent....	8	12	14	16	18	20
Time of Test.						
7 days	261	433	392	368	338	301
28 days	344	470	447	436	422	407
3 months	344	490	494	491	457	454
6 months	392	543	536	497	472	430
12 months	300	463	478	434	446	474

It is gratifying to note the growing appreciation of the important part sand plays in all cement work, in very many instances poor results are directly chargeable to the sand used. No cement will improve properly if mixed with very fine sand, and results will vary depending upon the characteristics of the fine material. It must also be kept in mind that an intimate mixture of cement and fine sand is very difficult to attain, and a thorough distribution of cement throughout the sand voids is absolutely essential to good results.

Sand that looks good is not always above suspicion and the following instance will serve to show the importance of testing the sand before use. An important hydraulic work was begun last spring in New Brunswick and the contractors and engineers congratulated themselves upon having what appeared to be an ideal deposit of sand and gravel for concrete work. The cement was thoroughly tested with standard sand and found O.K. When everything was ready an active start was made and considerable concrete was placed before any doubts arose; it would not set up, however, in a week's time (or longer it proved), and the cement was immediately tested again with favorable results and then some of the sand was examined. Upon the washing test it was noticed that a slight opalescence was imparted to the water, remaining in suspension several days, but leaving practically no deposit on sedimentation. The cement was then tested with this sand before and after washing, and the trouble at once located. The sand and gravel were both washed thereafter and good results followed.

A tabulation is added showing the tensile strength of cement mortars in the proportion of one part of sand to one of cement, by weight, for Rosendale or Natural cements, and two parts sand to one of cement for the Portland. A siliceous sand was selected for this test, carefully screened to the sizes noted and combined in the proportions given in the table. The test was made to determine the relative value of sand grains of different diameters, in combination with cement, and also to study the effect upon the tensile results of adding fine material.

Few unwashed natural sands are free of dust, of a loamy or clayey nature, containing high percentages of organic material, and in specifications usually calling for sand, clean and sharp and free from fine material, the importance of excluding this deleterious agent is recognized, but it is not always possible to enforce this absolutely, and from a mechanical analysis of a large number of samples, and casual inspection of sand in use at various points, I am satisfied that much sand is used that contains 5 per cent dust, and a good deal that carries as much as 10 per cent, or even more, in some instances.

TENSILE STRENGTH OF CEMENT MORTAR WITH SAND GRAINS OF DIFFERENT DIAMETERS.

Results given are the average of six briquettes.

Sand gauge per cent. used.				Natural cement mortar 1:1.									Portland mortar 2:1.					
				Water per cent.	"Union."			Water per cent.	"Hoffman."			Water per cent.	"Giant."					
No. 30.	No. 20.	No. 100.	Fine.		7 days.	28 days.	6 mos.		7 days.	28 days.	6 mos.		7 days.	28 days.	6 mos.			
100	...	...	...	17	156	195	352	15	115	168	314	10%	286	286	412
...	100	...	...	17	151	194	349	15	115	146	286	10%	294	331	473	
...	...	100	...	17	153	187	340	15	91	119	257	10%	301	225	294			
...	...	...	100	17	100	128	277	15	71	76	186	10%	129	158	225	
80	10	10	...	17	154	210	358	15	94	124	301	10%	301	300	496			
70	15	15%	2%	17	142	190	332	15	86	107	254	10%	301	300	428			
60	20	15	5	17	145	192	342	15	83	107	285	10%	307	311	419			
50	25	17%	7%	17	140	308	345	15	80	89	291	10%	391	408	508			
40	30	30	19	17	132	197	362	15	90	92	266	10%	336	357	475			
30	35	30	15	17	123	191	329	15	77	78	266	10%	362	369	478			
20	40	40	20	17	126	199	318	15	66	73	285	10%	317	374	499			
10	45	50	25	17	122	204	324	15	68	72	221	10%	291	354	488			
50	...	...	50	17	108	185	317	15	62	70	239	10%	347	367	551	
30	50	...	...	17	154	222	323	15	82	107	318	10%	440	408	542	
50	...	50	...	17	150	210	344	15	78	88	290	10%	369	336	438			
25	25	25	25	17	138	183	302	15	74	68	250	10%	279	337	447			
40	...	60	...	16	179	256	355	14	95	100	342	9%	257	331	451			

MEMORANDA.—All proportions and percentages determined by weight.

Natural sand used, first passed through No. 8 screen and residue excluded.

No. 30 sand passed No. 20 screen and caught on No. 30 screen.

No. 20 sand passed No. 8 screen and passed on No. 20 screen.

No. 100 sand passed No. 30 screen and caught on No. 100 screen.

"Fine" is clean white sand sifted through the No. 100 screen.

The fine material passing the No. 100 mesh screen, used in this test, was obtained from a clean, white siliceous sand, and if, with increasing amounts of this material, a falling off in tensile results appears, it can in no sense be taken as a measure of what would follow by using sand containing a dust of loamy or clayey nature, but it is in a way suggestive. The cements used in this test were of the same sample as in the other tests previously referred to.

The sand mortar test is the true basis upon which to judge the value of cement, and I believe the proportion of sand to cement should be the same as employed in the actual work of construction. Unfortunately this was not carried out in the above test of the natural cements for the reason that results were desired, for purposes of comparison, with previous tests in the same laboratory, in which the crushed quartz or standard sand was used in the proportion of one part sand to one of cement.

Explanation of the results is hardly required; it will be noticed particularly in the natural cements, how uniform and constant is the falling off in strength at the 7-day period, as the amount of fine material increased. This tendency, in the case of Union, disappearing at the 28-day period, at which time rather remarkable uniformity is found in all the combinations, except the 100 per cent. "Fine"; serious retardation in the improvement of the Hoffman, with the addition of fine material in the sand, is noticed between the 7-day and 28-day periods, the mixtures containing over 5 per cent. "Fine" remaining almost latent for this time, three of the combinations showing an actual loss, while four make a small gain, the average gain being two pounds; a rapid recovery is found, however, in these combinations between the 28-day and 6-month periods, and it is to be regretted that longer time tests were not made.

A tabulation of the results, excluding the series in which all "Fine" and crushed quartz were used, is herewith given:

	7 days.			28 days.			6 months.		
	Av	Max	Min	Av	Max	Min	Av	Max	Min
Hoffman	84	118	62	99	163	70	277	316	221
Union ...	139	156	108	198	222	183	336	362	302

The effect of fine material upon the Portland cement is not so noticeable, even at the shortest period, except in the series with 100 per cent and 50 per cent. "Fine," and no parallel can be drawn between the test with Portland cement and the results with Rosendale cement, using the same combinations of sand.

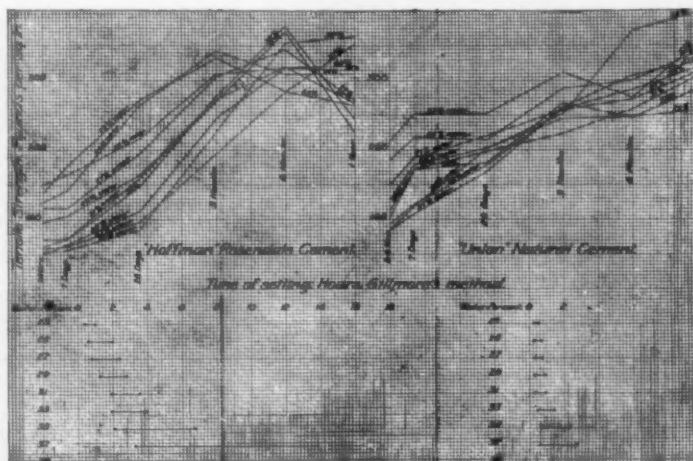
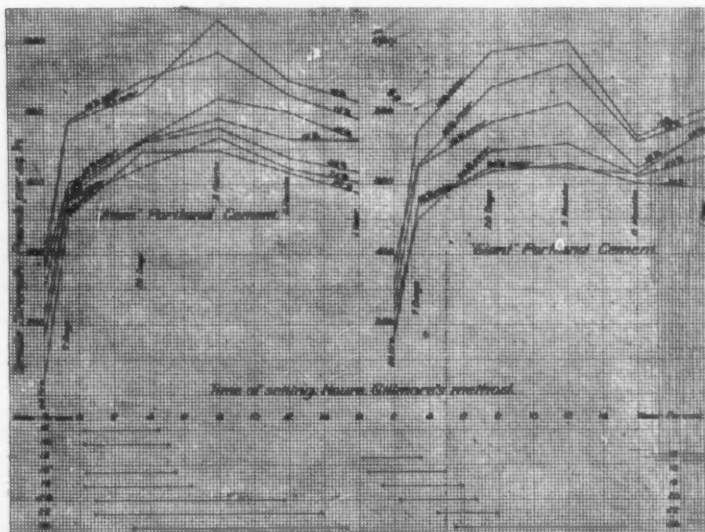
Cement users are coming to select their cement with more discrimination than ever before, their increased knowledge of the subject and the more extended use of the material show this to be necessary, and the natural result, owing to the struggle for commercial supremacy among the manufacturers, will be a better and more uniform product.

The chemistry of cement is an intricate problem and an academic knowledge of it without sufficient practical experience has and will result in much trouble to the manufacturer and user as well.

It is well said that "experience is the best teacher."

After reading his paper Mr. Larned answered many questions presented by the delegates. His exhaustive tests upon his subject and unlimited knowledge stamps him as one of the brightest minds of the association.

Just before adjournment for the day a telegram was read to the convention which contained the congratulations and best wishes of Mr. John H. Givens, the chairman of the first convention of National Cement Users.



A SOCIAL SESSION—EVENING OF JANUARY 11th.

Although the business of the convention was conducted in a rather strenuous fashion, inasmuch as night sessions were held besides those of the day, the entertainment feature was not neglected by the members of the Milwaukee committee, and this evening the entire number of delegates were welcomed as the guests of the cement interests of Milwaukee, and the local committee of the Builders and Traders' Exchange and Builders' Club building. There was somewhat of a crush because the size of the convention could have hardly been estimated in advance, but there was nothing lacking in cordiality on the part of the hosts nor in the appreciative manner in which their guests entered into the festivities of the occasion. This feature, so important in the development of sociability between members of the association, was in no way neglected by the untiring local committee and the assembled concrete interests of Milwaukee.

There was a fine cold spread—cigars, hard drinks, malt drinks that looked just like foam. There was laughter and sport and no attempt to preserve order. It is said that some of the fellows tried to make speeches and before the entertainment had progressed very far they were all speaking. As nobody in particular was listening we can not report the result of these arguments, but after everybody was full of good things to eat and drink and even the sweet voices of the serio-comics were no longer enticing, the larger portion of the host sought repose while that special clique which is known as the "cement bunch" retired to a smaller room to have a banquet of their own in "the altogether." When the cement bunch get all together this usually happens.

It is reported that they had bottles without stoppers; in fact, there was nobody there to "stop-er." Of the songs they sang, the jokes they cracked and the stories they told, are they not recorded in the secret archives of the association?

The first gleam of dawn came sneaking in, before the curtain(?) went down on the entertainment. Fred Paulson, of the Lehigh or Swett of the Atlas can tell you the whole thing. The president never did go to his downy couch that night, yet strange to say Harmon S. Palmer and Stevens didn't even know there was anything on, but you can bet that George Burridge and Lockley, of the Newago, were right in the bald-headed row with the entire local committee. Behrle swears he never saw it, and Monsted "jess shakes he's haid."

MORNING SESSION, JANUARY 12th.

Another experience meeting was held this morning, but this time was on the subject of cement sidewalks, and Mr. George L. Stanley took charge of the discussion which resulted in the dissemination of much knowledge in this direction and was highly profitable to those in attendance.

Mr. H. J. Jackson, of Chicago, the newly elected secretary of the section on Art and Architecture, occupied the platform for a brief time and requested that pictures and sketches of any kind of cement structures be sent to him at 681 West League Street, Chicago, Ill., so that his committee could keep well in touch with the progress of the industry in this direction. His remarks were well received.

President Humphrey at this point announced that the convention was next to consider the place of holding the 1907 convention, and took pains to instruct the delegates regarding the requirements which are so essential to the comfort and convenience of a large convention of this kind, in order to prevent unwise selection. Secretary Brown then read invitations from Columbus, Ohio, Norfolk, Va., Chicago, Cincinnati, Denver, Col., and Jackson, Mich. Mr. E. M. Walton also presented the name of Kansas City. Before a vote was taken on this matter the convention passed a resolution authorizing the president and first vice president to appear before the proper committee of Congress and plead for the increased appropriation so much needed for the construction of the proposed tests of concrete which have been previously mentioned.

Following this the convention listened to speeches from representatives of the various cities desiring the next annual meeting, and after a heated discussion, a vote was taken which resulted in the selection of Chicago. It is understood that the actual selection of a meeting place is in the hands of the executive committee, as provided in the new charter, but the vote was taken to get an expression

of the preference of the convention.

After a motion extending the thanks of the convention to the city of Milwaukee for its hospitality the morning session adjourned.

AFTERNOON SESSION, JANUARY 12th.

This session of the convention was not so greatly attended as previous ones, owing to the fact that a great many of the delegates had taken their departure.

Immediately upon opening, the announcement was made of the election of Mr. George P. Stanley, of Ashtabula, Ohio, as the chairman of the Committee on Streets, Sidewalks and Floors, and the selection of Mr. E. L. Condon, of Chicago, in the same capacity on the section of Re-inforced Concrete.

President Humphrey read the report of the Committee on Laws and Ordinances, owing to the absence of Mr. H. C. Henley, of St. Louis, chairman of that section.

It is to be regretted that the following paper which was presented to the convention by Mr. R. P. Miller, chief engineer, Bureau of Buildings, New York City, on "Legislation Concerning the Use of Cement in New York City," was not listened to by a larger audience, although a more interested one could not be imagined.

PROPER LEGAL REQUIREMENTS FOR THE USE OF CEMENT CONSTRUCTIONS.

BY R. P. MILLER, C. E.

The prime function of a building law is the protection of the general public against the dangers resulting from: First, bad construction; second, hazardous surroundings; third, defective equipment; fourth, inadequate means of escape; fifth, unsanitary conditions.

The enforcement of such law is included in the police powers of the state or municipal government.

The third, fourth and fifth of the dangers above specified may be entirely dismissed from consideration in this paper. They relate to the supplying of proper fire-fighting appliances in structures, and the affording of good and sufficient means of escape from fire or panic to the occupants of buildings, and securing healthful surroundings for them. They apply equally to all kinds of constructions, irrespective of the materials used. The other two dangers, bad construction and hazardous surroundings, do very materially concern the question under discussion.

The dangers of bad construction would include those due to bad materials, bad workmanship, including incompetent supervision, and bad design. (This is not the logical order, but this order is taken for convenience in this discussion).

The dangers of hazardous surroundings are those attending the inability of a building to withstand attacks from outside sources, such as excavations on adjoining premises, but more particularly fire in adjacent structures. When we have provided against these in our laws, we have secured the essential requirements that constitute a satisfactory law.

It is the object of this paper to consider what these requirements are, so far as they apply to the use of cement, and especially from the standpoint of one who has been called upon to administer the law for a period antedating the present phenomenal growth in the cement industries.

Cement is used in different ways in building construction; most extensively in mortar, very largely in concrete, both plain and reinforced; in increasing quantities in building blocks; also for cement bricks, artificial stone, stucco, and in perhaps other less important ways.

In whatever way cement may be used in construction, its quality should be up to a certain standard, and it is properly within the province of the lawmaking power to fix that standard, or at least to recognize some standard otherwise established and recognized. This may be done either by giving a complete specification in the law, or authorizing the executive officer of the building bureau or department to prescribe, within proper restrictions, the requirements which all cements must meet. The former way is the less desirable, not only in the particular matter under discussion, but in all building law, as it retards progress and makes no provision for new materials and processes or improvements. Building laws should be sufficiently flexible to be capable of meeting new conditions. This can be best accomplished by laying down in the law only fundamental principles and investing the executive officer with power to fix the more definite requirements. That this power

may not be abused, it should be restricted to such an extent as to require the publishing of all proposed requirements, and the holding of public hearings, if demanded, before the same becomes effective.

In the case of cement, the fundamental principles should be such as to secure strength and soundness. As to the more specific requirements, nothing better could be done than to adopt a standard specification promulgated by some organization of recognized national reputation, such, for instance, as that of the American Society for Testing Materials. No specification ever drawn satisfied everybody, but one presented by such an organization might well receive legal sanction, even though it does not in some particulars meet the views and criticisms of the building official immediately concerned.

As to strength of cements, the present building code requires the tensile strength of neat briquettes to be for natural cements:

After 24 hours set in air, 60 pounds per sq. in.

After 1 day in air and 6 days in water, 120 pounds per square inch.

For Portland cements:

After 24 hours set in air, 120 pounds per sq. in.

After one day in air and 6 days in water, 300 pounds per square inch.

In the case of natural cements the requirements are still considered satisfactory, but for Portland cement the accepted present standard is higher, namely:

After 24 hours in air, 200 pounds per sq. inch.

After 1 day in air and 6 days in water, 500 pounds per square inch.

That is fully sixty-six and two-thirds per cent better than the old standard.

This illustrates, in a measure, what has been said about the flexibility of law. As conditions improve, it should be possible for the building official to demand the use of up-to-date material.

Neither the New York building code, nor any other building law that has come to our attention, makes any provision for soundness, yet this would seem to be the more important characteristic of a cement. A contractor or speculative builder would possibly not care whether his structure lasted beyond the final payment or the transfer of the property, but the interests of the public demand that it shall. In some cases self-interest would also require lasting qualities. The manufacturer of concrete building blocks or cement brick could not afford to have his product disintegrate in six months or a year after it has been put into a building; and yet this would happen if his cement should be unsound.

So long as cements were used in constructions where the individual masses were large and unbroken, the importance of soundness in cement was not so apparent. But since the introduction of building blocks, and especially of reinforced concrete construction, this matter becomes of first importance. Imagine, if you will, the consequence of the disintegration of a concrete column, due to unsound cement, in the basement of a heavily loaded five-story warehouse.

Municipal inspection bureaus could not of course inspect all cements used in building operations, nor is it the function of the government to do so. The law should require, however, as it does in New York, that all brands of cement be tested under the supervision of the proper official, at such times and as often as may be deemed necessary; that a record of all cements answering the lawful requirements be kept for public information; and that no other cements be used.

The law should further prescribe that all cements used in important work, especially in work where the masses in the individual members composing the structure are comparatively small (compared to the entire mass), such as reinforced column and floor work or building block manufacture, should be tested for strength and soundness by the contractor or manufacturer at some reputable laboratory, and a certified copy of such tests filed with the proper building official.

Mortar and concrete, it may be said, are the forms in which cement for building purposes is always used. It is therefore quite within the province of the law to prescribe the characteristics of the other component materials. These may be one or several of a number of materials; sand, gravel, broken stone of many varieties, slag, cinders, broken brick, etc. The extent to which any of these materials is used will depend largely on local conditions. The proper proportions in which they are used vary with the material and the sizes used. To get the best results the mixture must be well balanced, the smaller particles

filling the voids of the larger, and the cement completing the mass by binding all together. In consequence, it becomes difficult to prescribe mixtures and proportions that shall be lawful, and at the same time secure the best results, for any one of the several materials specified may not always run uniform in size, and the proportions would very properly be changed continually to meet the new conditions. How then shall the law control mixtures to secure safe and just results?

In the case of material or mixture that is made up into shapes and units and sent to the structures to be used, a certain standard of strength should be fixed by law, and the maker should be required to test his product under the direction of the building official. If necessary or desirable, certain limiting proportions might also be prescribed, but so long as the product of any plant meets the prescribed standard of strength, the particular proportions or materials used are of small moment. This requirement would apply to such materials as building blocks, cement bricks, artificial stone, etc., or such as can be easily bought in the open market.

About nine months ago, the New York Bureau of Buildings promulgated certain requirements as to strength and other characteristics for materials of this nature, and the conditions under which tests shall be made and approvals issued. The requirements conditioning the acceptance of the materials were based on the results of an elaborate series of tests on common brick as delivered in the New York market, and on the theory that any new material should be at least as good as that most commonly used. These regulations containing the requirements were published in the technical journals, and it was hoped at that time they would bring forth such discussion and criticism as would be useful in determining whether the requirements were fair or perhaps too severe. Thus far, no objections based on reliable data have been made, and this is probably due to the total lack of definite information.

Section 14 of the New York regulations is as follows:

"14. The following requirements must be met to secure an acceptance of the materials: The modulus of rupture must average four hundred and fifty and must not fall below three hundred and fifty in any case. The ultimate compressive strength must average three thousand pounds per square inch and must not fall below twenty-five hundred in any case. The percentage of absorption (being the weight of water absorbed divided by the weight of the dry sample) must not average higher than fifteen per cent and must not exceed twenty per cent in any case. The reduction of compressive strength must not be more than thirty-three and one-third per cent, except that when the lower figure is still above three thousand pounds per square inch, the loss in strength may be neglected."

The Philadelphia Building Bureau adopted these regulations *in toto* at the time, but have recently modified them so far as they relate to concrete building blocks. Their requirements are as follows:

"14. The following requirements must be met to secure an acceptance of the materials: The modulus of rupture for concrete blocks at 28 days old must average 150 and must not fall below 100 in any case. The ultimate compressive strength at 28 days must average 1,000 pounds per square inch, and must not fall below 700 pounds in any case. The percentage of absorption (being the weight of water absorbed divided by the weight of the dry sample) must not average higher than 15 per cent and must not exceed 20 per cent in any case. The reduction of compressive strength must not be more than 33%, per cent, except that when the lower figure is still above 1,000 pounds per square inch, the loss in strength may be neglected."

We are not prepared to defend these requirements against all criticisms; in fact, any information of tests that would establish the correctness or the unfairness of these requirements would be most welcome. This much, however, must be said, that thus far several new materials have met the New York requirements, and among them, cement brick. No concrete building blocks have yet been tested in accordance with these requirements. While it would seem that some change is desirable for the benefit of the building block, it is believed that the Philadelphia requirements are too low. It may be true that by virtue of the larger size of the units, a wall built of building blocks has some advantages of strength over one built of smaller units, such as common brick, still so great a drop in ultimate compressive strength below that required for brick or stone concrete as is permitted by the Philadelphia regulations seems unreasonable. No one contends that an ultimate compress-

ive strength of 2,000 pounds at 28 days for concrete, or of 2,500 pounds for brick is too high, yet it is proposed to accept building blocks with an ultimate compressive strength of 1,000 pounds at 28 days, and even then make no provision for extra thickness in a wall built of building blocks above that required for brick or Portland cement concrete.

In the case of reinforced concrete, however, the question of the mixture must be disposed of in a different manner. Reinforced concrete construction is put up in place. The component parts—concrete and steel—are differently disposed for varying conditions of shape, span and loading. The entire construction must be carefully planned beforehand, every part must be definitely fixed, and the size and position of each element must be determined by calculation. In order, therefore, that any governmental control in such a case may be had, a definite mixture must be used, the physical characteristics of which, crushing strength, modulus of elasticity, adhesive power, resistance to shear, are well known; and the lawmaking power is fully justified in prescribing such mixture for all work of that kind under its jurisdiction. What that mixture should be will again depend somewhat on local conditions, for it would certainly be out of all reason to prescribe a trap rock mixture in a locality where trap rock is commercially unobtainable.

The New York regulations permit a variation in the mixture from the prescribed proportions of 1-2-4, as long as it can be demonstrated by tests, under the supervision of the bureau, that the compressive strength at 28 days does not fall below 2,000 pounds per square inch. Experience has shown that very little latitude should be allowed in this matter of variation of mixture, as it is practically impossible to properly control the construction where more than one mixture is used. If the designers could be held criminally responsible for their results, no limitations of this kind would be needed; but so long as the building authorities are held to a partial accountability they are fully justified in insisting on a single well known mixture for reinforced concrete construction.

Before dismissing this question of materials and mixtures, one other commonly used mixture should be considered, namely, cinder concrete. The excellent fire-resisting quality of this concrete makes it a most useful building material. Its great lack of uniformity and its consequent unreliability in strength make it necessary to deprive it from consideration as a construction whose strength is calculable. The practice in New York is to insist on load tests on full-sized constructions for every variation in span and detail of construction, in order to determine allowable working loads.

Floor constructions are here alluded to, as that is practically the only form requiring strength in which it is used. The factor of safety demanded is ten, that is the section of floor to be tested is loaded till it breaks, and one-tenth of the uniformly distributed breaking load is taken as the working load.

Good workmanship is important in all construction, but in no form of construction is it so important as in reinforced concrete; and in that form of construction it is no more nor no less important than good materials or good design. So far as law is concerned, however, workmanship may be dismissed in a few words. The law can simply demand that all possible care be exercised in securing it. It will always be secured if there is competent supervision. Competency is secured by study and experience. It is not necessary to go into such details as cautioning against freezing mortar, using cements that have begun to set, where there is competent supervision. There would be no end to these detailed requirements if once begun. How to secure competent supervision in all cases, especially where builders and owners are unwilling to pay for it (though it is an excellent investment), is a difficult problem. The following suggestions may, however, be a step toward the solution. Let it be made compulsory that every building operation shall be in charge of a licensed inspector or superintendent, who shall have received his license from a competent examining board, and who shall be criminally responsible for the work and for infraction of the law. The details of this plan have no proper place in this paper, for they are of general application and not peculiar to this form of construction.

For the design of a structure the designer must always be responsible. The supervision of the design by the building authorities should only be to assure that the allowable working stresses have not been exceeded, that the prescribed floor capacities are provided, that proper light and ventilation

are secured, etc.; in fact, that the general provisions of the law are complied with.

To go beyond this is to relieve the designer of that much responsibility and to place it where it does not belong. Building departments or bureaus should be bureaus of record, and the records should be complete. The Prussian regulations on reinforced concrete go so far as to even demand that a copy of all calculations as to strength be filed, although they may not be checked over.

There is a great tendency to particularize in our laws and to add provision upon provision, to make more and more a complete specification of the law. Instead of this, as has already been stated, only fundamental principles should be included in the law. The designer should be allowed all possible freedom, but at the same time, he must be made absolutely responsible for his work.

So long as these conditions do not obtain, it is perhaps better that the law should go farther than necessary in prescribing limitations. Under such circumstances, it is to the interest of the good and honest designer and builder and user of cement that the law should err on the safe side and take a conservative position.

New York City was the first municipality in this country to prescribe regulations on the use of reinforced concrete. They were drawn up after much study and considerable discussion among experts at a time when the construction was not widely known. But that they have been fair and good is attested by the fact that with not many changes the requirements on that form of construction, laid down in the model building code recently proposed by the National Board of Fire Underwriters, are those of New York City. And these latter requirements were, as stated by one closely connected with their promulgation, the result of study, of suggestions and criticisms of many engineers and experts. Besides these two codes there are ordinances in Chicago, Cleveland and Denver.

Taking up in more detail the fundamental principles to be laid down for the guidance of the designers, these should include:

1. The allowable stresses in the materials.
2. The methods used in calculating the stresses produced.
3. The guiding principles in determining the resistance to these stresses.

It is generally conceded that the tensile strength of concrete should not be considered.

New York, Chicago and Cleveland laws prescribe working stresses, but the proposed code of the National Board of Fire Underwriters prescribe a factor of safety applied to working loads and the use of ultimate stresses. It is not proposed to discuss here the superiority of either method over the other, as both will give safe results if intelligently used. The following stresses should be used and are those prescribed by the laws cited, the ultimate stresses being those used by the National Board of Fire Underwriters:

	Working Stress.	Ultimate
For extreme fibre stress of concrete in compression.....	500 lbs. per sq. in.	2,000 lbs.
For shearing stress in concrete.....	50 lbs. per sq. in.	200 lbs.

	Working Stress.	Ultimate.
For concrete in direct compression.....	350 lbs. per sq. in.	
For tensile stress in steel.....	16,000 lbs. per sq. in.	Elastic
For shearing stress in steel.....	10,000 lbs. per sq. in.	Limit
For adhesion of concrete to steel.....	80 lbs. per sq. in.	200 lbs.

The Denver ordinance gives no stress values, but refers to a hand book, a practice that is not to be commended. The Chicago ordinance permits a shearing stress in concrete and adhesive value of 75 pounds per square inch, which, in the opinion of the writer, is too high. On the tensile value of steel there is also a difference, only New York and Cleveland fixing a definite figure—16,000 pounds, and Chicago permitting one-third of elastic limit. On this point there is much opportunity for discussion. The writer believes a definite value should be adhered to, and that should be 16,000 pounds working stress.

It is generally believed that the adhesion of concrete to steel may be taken the same as the shear to concrete. The Denver law, however, prohibits the use of plain bars. This is an unjust limitation on the designer, so long as the safe limit of adhesion is not exceeded. When this occurs, all the laws are agreed that other provisions should be made. So, too, would it be an unfair requirement to prescribe the use of stirrups unless the safe resistance to shear is exceeded, or to insist on the use of certain bars to secure rigid attachments of stirrups. This is no more important than the placing of tension bars in their exact position, which must be taken care of in the supervision of the construction.

The Cleveland law makes provision for compression in steel. This is unnecessary, as the allowable compression in the steel must depend on the assumption of the ratio of moduli of elasticity of the two materials, unless the steel is designed to take all the load, in which case we are no longer dealing with reinforced concrete.

The maximum ratio of length to diameter of columns is fixed at twelve in all but the Denver law, where hooping is required when the ratio exceeds four.

In the calculation of bending moments and the determination of moments of resistance, the practice is quite uniform, and the New York provisions are suggested as sufficiently full:

"13. The following assumption shall guide in the determination of the bending moments due to the external forces. Beams and girders shall be considered as simply supported at the ends, no allowance being made for continuous construction over supports. Floor plates, when constructed continuous and when provided with reinforcement at the top of plate over the supports, may be treated as continuous beams, the bending moment for uniformly distributed loads being taken at not less than WL divided by 10; the bending moment being taken at WL divided by 20 in the case of square floor plates which are reinforced in both directions and supported on all sides. The floor plate to the extent of not more than ten times the width of any beam or girder may be taken as part of that beam or girder in computing its moment of resistance.

"14. The moment of resistance of any concrete-steel construction under transverse loads shall be determined by formulae based on the following assumptions:

"(a). The bond between the concrete and steel is sufficient to make the two materials act together as a homogeneous solid.

"(b). The strain in any fibre is directly proportionate to the distance of that fibre from the neutral axis.

"(c). The modulus of elasticity of the concrete remains constant within the limits of the working stresses fixed in these regulations.

"From these assumptions it follows that the stress in any fibre is directly proportionate to the distance of that fibre from the neutral axis.

"The tensile strength of the concrete shall not be considered."

It is believed that these provisions go as far as necessary (they are somewhat more elaborate in the National Board of Fire Underwriters Code), and do not hamper the designer unnecessarily. For a comparatively new form of construction, in which uniform practice is not yet thoroughly established, it can not be said that they go too far.

Regarding the use of concrete building blocks in the design of new buildings, an important question arises as to the height to which they shall be allowed in walls. Chicago restricts the use to dwellings and stables not more than two stories in height. Cleveland allows them for buildings of ordinary (non-fireproof) construction four stories in height. Philadelphia permits them for six-story buildings. Their use is not yet allowed in New York (Manhattan).

Concrete is generally assumed and frequently accepted as fireproof. The later laws on concrete recognize it as fireproof and prescribe minimum thicknesses to be used for covering the imbedded metal. That concrete is incombustible can not be denied, that it will not disintegrate under fire can not be maintained (stone and gravel concrete only being considered now). The New York building authorities have made fourteen fire tests on concrete constructions, of which seven proved successful. It would seem that in the cases of failure the concrete when tested was too green, that is to say, it contained too large a percentage of uncombined water which was converted into steam and caused the disruption of the concrete. This makes it necessary to guard against the occupancy of concrete structures within the time required for the concrete to appropriate all its water. That a reinforced concrete building is far superior as a fire-resisting structure to a mill constructed building must be conceded; that it is equal to the best type of fireproof construction can not justly be claimed.

The best practice in this particular is that given in the code of the National Board of Fire Underwriters, as follows:

"Reinforced concrete construction may be accepted for fireproof buildings if designed as hereinafter prescribed; provided, that the aggregate for such concrete shall be hard-burned broken bricks, or terra cotta, clean furnace clinkers, entirely free of combustible matter, clean broken stone, or furnace slag, or clean gravel, together

with clean siliceous sand, if sand is required to produce a close and dense mixture; and provided, further, that the minimum thickness of concrete surrounding and reinforcing members one-quarter inch or less in diameter shall be one inch; and for members heavier than one-quarter inch the minimum thickness of protecting concrete shall be four diameters, taking that diameter, in the event of bars of other than circular cross-section, which lies in the direction in which the thickness of the concrete is measured; but no protecting concrete need be more than four inches thick for bars of any size; and provided, further, that all columns girders of reinforced concrete shall have at least one inch of material on all exposed surfaces over and above that required for structural purposes; and all beams and floor slabs shall have at least three-quarters inch of such surplus material for fire-resisting purposes; but this shall not be construed as increasing the total thickness of protecting concrete as herein specified."

Of the fireproof quality of cinder concrete there can be no question, as already intimated. The thirty-six tests made under the supervision of the New York Building Bureau would remove any doubt in the matter.

Of the fireproof character of building block walls very little is known. Information is much desired.

The weathering qualities of concrete, more especially in the shape of building blocks, should be fully and carefully investigated. Some freezing tests made for the New York Building Bureau on cement blocks indicated a tendency of the material to distend, and a loss of compressive strength of about forty per cent resulted. On concrete building blocks, the absorption is probably high (this is not based on actual observation), and a deterioration of the material in freezing seems likely. To guard against danger in this respect, the following New York provision is desirable:

"That the freezing and thawing process must not cause a loss in weight greater than 10 per cent nor a loss in strength of more than 33 1/3 per cent, except that when the lower figure is still above three thousand pounds per square inch, the loss in strength may be neglected."

To this may be added, that if the lower figure is still above two thousand pounds per square inch, the loss may be as much as fifty per cent, but no more.

In conclusion, it may be said that of all the suggestions made in this paper, the most important is the one fixing the responsibility for bad design and bad workmanship. It is decidedly in the interest of every cement used that so valuable a structural material as cement should be applied honestly and intelligently, leaving no chance for its condemnation because of improper or irresponsible work.

After the conclusion of his reading Mr. Miller was beset with questions from a great number of delegates present, all of which he answered very carefully, although he modestly stated that he attended the convention more in the capacity of a student than a teacher. If more public engineers were as well instructed as Mr. Miller regarding the use of concrete, the difficulties which now attend its introduction in some localities would be greatly overcome. He has a clear knowledge of its incalculable merits.

Following Mr. Miller's papers Mr. J. C. McClenahan, a well known manufacturer of cast stone of New York City, presented an able discussion on "Manufactured Stone." This paper was well prepared and contained a great deal of valuable information, and we regret that lack of space in this issue will not allow its presentation here.

Mr. E. T. Cairns, of Chicago, vice chairman of the Committee on Fireproofing and Insurance, presented the report of his committee which dealt intelligently with the provisions of the insurance companies in regard to concrete construction, and cited some very remarkable cases where concrete was demonstrated to be of great fireproofing value. This report will of course appear in the regular printed proceedings of the convention.

Owing to repeated requests for a general talk from President Humphrey he was obliged to deliver the last speech of the 1906 convention in which he discussed the concrete industry pro and con, and in answer to many questions propounded by interested members, dispensed much information valuable to all parts of the concrete industry, some of which we hope to be able to present later.

This last session of the big convention lasted until 6:30 p. m., when the president, in a few well chosen words, stated that he appreciated the inter-

est manifested in this meeting of the association, and was well pleased with the progress attained, and in conclusion stated that he looked forward to the convention of 1907, which will in all probability be held in Chicago, with the belief that it will exceed all former meetings in size, in educational features and in interest. It is certain that the past convention of the National Association of Cement Users resulted in material good to all in attendance, including both cement users and exhibitors.

REGISTERED ATTENDANCE.

Fort Smith, Ark.—A. Ellefson.
Hot Springs, Ark.—W. S. Sorrels, C. E. Marks.
Little Rock, Ark.—D. G. Taylor.
Denver, Colo.—C. L. Wilber.
Bloomfield, Ont. Can.—H. W. Bedell.
Collingwood, Ont. Can.—Jas. Shearer.
St. Catherine, Ont., Can.—Chas. F. Roland, W. H. Swazey.
Toronto, Can.—Chas. D. Watson.
Waterloo, Ont., Can.—Geo. B. Moogk.
Wellington, Ont., Can.—W. P. Niles.
Americus, Ga.—O. P. Wallis.
Atlanta, Ga.—J. N. Brown, S. C. Arkens, J. L. Clark.
Alton, Ill.—H. Luer, E. J. Ash, Henry Beirer, W. C. Beirer, E. C. Mack.
Ascola, Ill.—Wm. Lough.
Belvidere, Ill.—E. E. Truesdell.
Bradford, Ill.—Fred G. Boyden.
Centralla, Ill.—J. M. Blakely, J. W. Clark.
Chadwick, Ill.—W. W. Bailey, J. W. Spinka.
Chicago, Ill.—C. W. Boynton, Edward T. Cairns, Geo. W. De Smet, Wm. Chambers, E. S. Hotchkiss, Honore J. Jaxon, Chas. W. Kenney, P. O. Krott-nauer, L. R. Leppler, M. N. Lovewell, P. C. McArdle, John Molitor, Charles G. Reid, Jos. Schall, B. H. Bisbee, H. M. Capron, Curt M. Treat, J. E. White, Jos. B. Wilson, W. O. Williams, Wm. S. Hotchkiss.
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Elgin, Ill.—Wm. Bell, John McBride.
Elmhurst, Ill.—Wm. Hammerschmidt, R. Hammerschmidt.
Elsah, Ill.—Alex Marshall.
Evanston, Ill.—J. P. English, James Wigginton, Jr., Tom J. Foley, H. M. Lavers, F. H. Gill, Robt. Gill, D. McCann, C. H. Bartlett, N. Underwood.
Freeport, Ill.—Freeport Concrete Construction Co.
Fairbury, Ill.—M. F. Kammerer.
Glencoe, Ill.—J. J. Flanders.
Granite City, Ill.—A. H. Eisenmenger, A. W. Morris, R. Morris.
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 O'Neill, Robertson Cook, W. J. Donahue & Co.,
 Chas. Donnelly, C. Herman Dörner, S. J. Dowling,
 A. N. Fairchild, Gus Frey, James Graham, W. J.
 Graham, A. Heep, W. A. Kimpel, C. J. Kramer, W.
 A. Lewis, Chas. Ellis Mellig, C. Hanson, S. D. Aus-
 tin, J. S. Sanborn, Frank Ehler, M. Dix, W. L.
 Stimple, G. W. Burr, C. Becher, Bert Perigo, Mr.
 Bond, Mr. Lauman, Mr. Hahn, Mrs. W. J. Gent-
 ner, O. B. Hutchens, R. E. Hutchens, A. W. Friske,
 H. C. Fuldner, A. Monsted, George Niles, Mr. Cut-
 ter, Mr. Dolman, Mr. Stryer, Wm. Durnuth, C. C.
 Sprague, Otto Gelhaar, John L. Hart, C. J. Poetsch,
 Robt. F. Pregel, Riensen & Wilke, G. F. Shreve,
 E. W. Meyer, T. L. Smith, W. J. Buckley, South
 Side Cement Co., A. Toppins, H. R. Hansen, E. A.
 Sponholz, Gus Kahn, P. J. Bliffert, Jr., Wm. C.
 Lantry, R. Cook, M. T. Ash, Alfred Maurer, Wal-
 ter B. Potter, W. H. Carson, Rudolph Zek.
 Niles, Wis.—Wm. Chambers, Robt. Higgs,
 Art. F. Partridge.
 Oostburg, Wis.—J. Fuhreman, Jr., Jacob Fuhre-
 man.
 Oshkosh, Wis.—Eli Defuet.
 Perley, Wis.—John Buehler.
 Port Washington, Wis.—Joe Ubbink.
 Princeton, Wis.—Elisha Hall.
 Racine, Wis.—E. C. R. Scott.
 Two Rivers, Wis.—Frank Rumpf.
 Viroqua, Wis.—C. E. Lander.
 Watertown, Wis.—Thomas Darcey.
 Waukesha, Wis.—Oswall A. Dreman, John A.
 Rodgers.
 Waupaca, Wis.—Con. Griener.
 Wausau, Wis.—Geo. W. Clark, C. A. Nutter, John
 Andersen.
 Wauwatosa, Wis.—C. C. Jacobs, W. H. Minahan.
 West Bend, Wis.—A. C. Fuge, West Bend Con-
 crete Works.

MACHINERY AND EXHIBIT FEATURES:

Denver, Colo.—Will Scoutt, (Chicago, Ill.)
 American Hydraulic Stone Co.
 Washington, D. C.—Harmon S. Palmer, J. D.
 Wood, H. H. Swan, Harmon S. Palmer Hollow
 Concrete Building Block Co.
 Chicago, Ill.—Indestructible Post Co.; Chas.
 V. Walker, Chicago Pneumatic Tool Co.; John F.
 Pearce, F. B. Wright, John Trevor, Contractors'
 Supply and Equipment Co.; A. D. Mackay, A. D.
 Mackay & Co.; C. E. Bathwick, T. M. Meek, Iver
 R. Johnson, Herman Ueslin, (Winthrop Harbor,
 Ill.) Municipal Engineering and Contracting Co.;
 W. D. Cummings, New Enterprise Machine Co.;
 W. M. Duncan, Shaw Block Co.; C. W. Stevens,
 G. W. Tainter, Jr., Stevens Cast Stone Co.
 Paris, Ill.—Williams Manufacturing Co.; J. W.
 Stuart, Nonpareil Block Machine.
 Elkhart, Ind.—C. L. Catherman Hoosier Cement
 Post Machine Co.
 Indianapolis, Ind.—H. S. Quick, Monarch Ce-
 ment Post Co.
 South Bend, Ind.—F. A. Borst, Mentor Wet-
 zeln, F. Schurr, S. L. Kelly, G. B. Pulfer, W. A.
 Stewart (Antigo, Wis.), P. F. Tall (Indianapolis,
 Ind.) F. J. Fitzsimmon (Chicago, Ill.), D. M.
 Click (So. Omaha, Neb.), J. W. Cooper (Minne-
 apolis, Minn.), C. D. Higgins (Aberdeen, S. D.),
 A. M. Rosick, Ideal Concrete Machinery Co.; J. H.
 Willey (Plymouth, Ind.), Edmonson Machine Co.;
 A. P. Starr, E. Snell, H. H. Hutson, George Braun,
 South Bend Machinery Manufacturing Co.
 Terre Haute, Ind.—W. P. Pettyjohn, L. Petty-
 john, Geo. L. Barnes, L. P. Dunne, E. H. Thomp-
 son, The Pettyjohn Co.
 Warsaw, Ind.—T. M. LeHew, John N. LeHew,
 T. M. LeHew & Son.
 Burlington, Iowa—W. F. Roney, C. B. Foster,
 W. S. Farrar, J. W. Sanderson, Chas. E. Nicoud,
 Cement Machinery Manufacturing Co.
 George, Ia.—Schoeneman Cement Block Co.
 Sac City, Iowa—J. A. Soderstrom.
 Waterloo, Iowa—H. L. Green, J. L. Shannon,
 Iowa Building Block Machine Co.
 Alpena, Mich.—J. H. Besser, The Besser Manu-
 facturing Co.
 Cassopolis, Mich.—O. A. Dever, E. K. Black,
 Dever Cement Tank and Silo Co.
 Grand Rapids, Mich.—C. Marsman, E. W. Sea-
 mans Co.; F. L. Dykema, The Dykema Co.; Nich-
 olas Battjes, Frank Battjes Fuel and Building
 Material Co.
 Jackson, Mich.—A. M. Haight, R. Schullinany,
 P. M. Wolf, W. T. Smith, J. Hunter, M. J. McGo-
 wan, L. H. Scott, C. F. Scott, L. McGowan, Aut.
 Bldg. Block Mach. Co.; S. L. Wiltse, Cem. Mach.
 Co.; Geo. Merrill, C. C. Helling, Coltrin Manu-
 facturing Co.; H. F. Abbott, Eureka Machine Co.;
 J. W. Hartwick, Geo. D. Scheffler, Mrs. Scheffler,
 Hartwick Machine Co.; R. B. Coltrin, Knicker-
 bocker Co.; C. Whitney, A. C. Dornfeld (Kenos-
 sha, Wis.) Simplex Manufacturing Co.; Eber S.
 Peek, Stringer Machinery Co.; C. O. White, Robt.
 Campbell, White Cement Machinery Co.
 Lansing, Mich.—C. L. McHenry, W. H. New-
 brough, A. Vibber, C. J. Conyne, The New Way
 Motor Co.
 Niles, Mich.—Niles Moulding Machine Co.; E.
 W. Thompson.
 Traverse City, Mich.—E. S. Williams, Helm
 Brick Machinery Co.; W. J. Hobbs, Queen City
 Brick Machine Co.
 Minneapolis, Minn.—O. U. Miracle, A. N. Pier-
 son, (New York) R. O. Miracle, Miracle Press
 Stone Co.; L. V. Thayer, Patrick Murphy, Peerless
 Brick Machine Co.; M. K. Sawyer, Perfection Block
 Machine Co.
 Kansas City, Mo.—E. M. Walton, I. L. Walton,
 F. S. Phipps, Walton Granolithic Stone Co.
 Akron, N. Y.—J. R. Thomas, Eastern Concrete
 Machinery Supply Co.
 North Tonawanda, N. Y.—W. W. Wade, Geo. F.
 Fisher, The Durolith Co.
 Rochester, N. Y.—A. T. Bradley, Ely Roberts,
 Lewis Kuster, Geo. Abbott, C. R. Lehrack, O. D.
 Tiffany, John N. Rauber, Robert Siebert, W. O.
 Williams, Century Cement Machine Co.
 Cleveland, Ohio—A. L. Boughton, J. W. Bought-
 on, The Standard Sand and Machine Co.
 Columbus, Ohio—S. M. Chase, The Chase Found-
 ry and Manufacturing Co.; C. E. Ottman, Kirk
 H. Brown, Hayden Automatic Block Machinery
 Co.; G. Jaeger, The Jaeger Machine Co.; D. J.
 Kraser, A. Clark, J. F. Angell, E. B. McDowell, S.
 M. Coe (Indianapolis, Ind.), Winget Concrete
 Machinery Co.; H. G. Simpson, Simpson Cement
 Mold Co.; J. M. Campbell, International Fence
 and Fireproofing Co.

Dayton, Ohio—J. W. Popenoe, T. O. Eichelberger, H. A. Schlick, Wm. Hughes, J. C. Collett, The T. O. Eichelberger Co.

Deshler, Ohio—S. A. Jones, David Hospins, Diamond Cement Machine Co.

Kent, Ohio—A. L. Post, F. A. Kershaw, The Standard Machine Co.

Toledo, Ohio—W. S. Barker, C. F. Nighswander, Barker & Nighswander.

West Park, Ohio—W. H. Caskey, The Cleveland Car Co.

Youngstown, Ohio—A. A. Pauley, Wm. Fleming, Concrete Stone and Sand Co.

Youngstown, Ohio—Youngstown Expanded Metal Fire Proofing Co.

Reading, Penn.—D. P. Sanders, Reading Brick Machinery Co.

Appleton, Wis.—W. H. Fisher, John Driscoll, M. K. Gochner, Easy Block Handlers.

Janerville, Wis.—John Rogers, Victor E. Rogers, Victor Concrete Post Machine Co.

Milwaukee, Wis.—C. L. Dane, Fairbanks, Morse & Co.; J. P. Sherer, T. B. Whitnall, F. W. Hadfield, Wm. Baunen, H. T. Behrle (Detroit, Mich.) National Building Block Machinery Co.; R. J. Schwab, H. S. Palmer Co.; D. A. Slattery, Ingersoll-Rand Co., Chicago Sterling Wheelbarrow Co.

Stroughton, Wis.—G. G. Mandt, M. G. Mandt, Mandt-Powell Concrete Machine Co.

SUPPLIES AND REINFORCING.

Chicago, Ill.—Geo. Roden, Northwestern Expanded Metal Co.

St. Louis, Mo.—T. L. Candron, (Chicago, Ill.) A. L. Johnson, W. C. Berry, St. Louis Expanded Metal Fireproofing Co.

Pittsburg, Penn.—Jacob B. Blaw, Blaw's Collapsible Steel Centering Co.

Milwaukee, Wis.—Fred Bogk, Wm. Pfeiffer, J. Frey, Ricketson Mineral Paint Works; A. W. Grider, E. J. Sigwalt, F. C. Bailey, Western Lime and Cement Co.

CEMENT REPRESENTATIVES.

Alpha Portland Cement Co., Henry Longscope, Philadelphia, Penn.

American Cement Co., Robert W. Lesley, Philadelphia, and E. S. Larned, Boston.

Atlas Portland Cement Co., Thos. M. Magiff, J. L. Austin, Geo. C. Ehlers, O. J. Schoeneclar, B. L. Swett, D. B. Pierson, (Hannibal, Mo.) New York City.

Castalia Portland Cement Co., Chas. L. Johnson, Pittsburg, Penn.

Chicago Portland Cement Co., J. W. Woodruff, J. U. C. McDaniel, W. F. Main, D. D. Drummond, Chicago, Ill.

Chickamauga Cement Co., W. P. D. Moross, Chattanooga, Tenn.

Dexter Portland Cement Co., Richard K. Meade, Nazareth, Penn.

Edison Portland Cement Co., G. B. Nutt, Pittsburg, Penn.

Illinois Steel Co. Cement Department, B. H. Rader, J. C. Van Dorn, H. S. Backus, Chicago, Ill.

Lehigh Portland Cement Co., C. A. Matcham, C. F. O'Neill, Allentown, Penn., and F. E. Paulson, Indianapolis, Ind., George P. Schwaab.

Marquette Cement Manufacturing Co., John W. Dickinson, John A. Dunlap, Wm. Dickinson, Robert B. Dickinson, Chicago, Ill.

Newaygo Portland Cement Co., Geo. Burrige, J. F. Lockley, Grand Rapids, Mich.

Pennsylvania Cement Co., W. W. Bale, New York City.

Sandusky Portland Cement Co., S. B. Newberry, Sandusky, Ohio, Glen M. Porter, Chicago, and R. R. Fish, Fort Wayne, Ind.

Vulcanite Portland Cement Co., Albert Moyer, W. Chambers, New York City.

Western Portland Cement Co., G. S. Bartlett, C. B. McKay, Milwaukee, Wis.

Wolverine Portland Cement Co., W. E. Cobean, Chicago, Ill.

There were many newspaper men, camp followers and others interested in the concrete block industry on hand. Rock Products issued a daily that covered the whole affair with glory, and elicited much good cheer and comment.

THE EXHIBIT FEATURE.

There was much grumbling on the part of the exhibitors on account of the fact that they could not all be together. Probably it was because they could not see what the other fellow was doing. It is safe to say that there never was a convention where exhibits were as much divided as they were at Milwaukee. Several of the exhibitors on the same floor where the papers were read were unable to demonstrate their machines at all while the proceedings of the conventions were going on. However, this was no reflection upon the local committee, who worked faithfully to see that all the exhibitors got what they wanted. Some of the exhibits were quite attractive and very instructive in character, and some of the exhibitors went to quite a great deal of expense in making their exhibits.

The Hotchkiss Concrete Stone Co., 1509 Manhattan Building, Chicago, was represented by Mr. E. S. Hotchkiss and his son William S. Hotchkiss. They were simply in attendance upon the convention and they attended to everything that was interesting.

Rock Products' headquarters at the Republican House were very popular with the delegates, but no visit was more appreciated than that of Mrs. H. F. Behrle, who called with Mr. Behrle, who is connected with the National Building Block Co., of Milwaukee.

Mr. H. G. Simpson represented the Simpson Cement Mold Co., of Columbus, Ohio. This firm makes cement molds of elegant and varied designs for the ornamental features of construction. Mr. Simpson showed several molds, and also some very handsome porch columns and balustrade work made on their molds.

No delegate saw more of the convention than Mr. A. A. Pauly, of Youngstown, Ohio, the well known inventor of the Pauly concrete wall machine. He has been perfecting a new hollow veneer block press. The Concrete Stone and Sand Co., of which Mr. Pauly is the president have issued a very attractive booklet explaining their several machines and their products.

The Walton Stone Machine Co., of Kansas City, Mo., did not make a display. Mr. E. M. Walton, the inventor of the machine and Mr. J. L. Walton, his brother, and Mr. Phipps were present. The Walton machine is a two piece block machine. Mr. Walton is an ardent advocate of the two piece system and says they will all come to it eventually as it is the only way to construct an absolutely dry wall.

The Eureka Machine Co., of Jackson, Mich., had two mixers which they displayed in the street outside the convention hall. These machines attracted large crowds. The Eureka mixer is not only one of the best, but one of the easiest to operate, both continuous and with batches. The exhibit was in charge of Mr. H. F. Abbott, who successfully demonstrated the many advantages of the Eureka. This concern makes both power and hand mixers.

The Standard Machine Co., of Kent, Ohio, had one of their mixers on exhibition in charge of Mr. F. A. Kershaw and Mr. A. L. Post. This mixer attracted considerable attention as it was the first time this firm has exhibited one of their machines. It is a new departure from the old style mixer, and is especially intended to meet the requirements of the concrete block manufacturers. This machine was described in detail in the last issue of Rock Products.

The International Fence and Fireproofing Co., of Columbus, Ohio, exhibited a model American concrete mixer in actual operation. This mixer is furnished in four sizes on skids or trucks and with or without power. The American is a strictly up-to-date mixer and attracted no end of favorable comment. It is strong and durable yet simple in construction and very easy to operate. Mr. J. M. Campbell was in charge of the exhibit and gave out a very nice leather card case as a souvenir.

Mr. Sid L. Wiltse, secretary of the Cement Machinery Co., Jackson, Mich., was on hand. Of course, he was representing the Normandin, Peninsula, Cemaco and other well-known concrete machines. His company was prevented from exhibiting their line at the convention on account of the lateness of the decision as to where the convention was to be held. Of course, everybody connected with the industry knows their machines anyhow. Mr. Wiltse was everywhere shaking hands with his many friends among the cement users.

The Contractors Supply and Equipment Co., of Chicago, had several of their newest concrete mixers in actual operation outside of the convention hall. This is one of the best known mixers on the market to-day and is in almost universal use. Space will not permit of a detailed description of their exhibit. However, most of our readers are very familiar with these mixers. Messrs. John F. Pearce, F. B. Wright and John Trevor, were in charge of the exhibit. They are all well-known to the trade and took pleasure in showing their machines to the large crowd.

The Pettyjohn Co., of Terre Haute, Ind., was one of the first exhibitors in the field and had their exhibit in good working order, in the Freie Gemeinde Hall. It was in charge of Messrs. W. P. and L. Pettyjohn, L. P. Dunne, E. H. Thompson and George L. Barnes, who took great pleasure in explaining the working details of the machine and distributing a neat little catalogue entitled "Our Two Cats." Of course, everyone understood that Pettyjohn believes in moving the machine and not the blocks. Their display was both attractive and instructive.

The Cement Machinery Manufacturing Co., of Burlington, Iowa, had one of the largest exhibits in the Freie Gemeinde Hall. Several of their new machines were shown for the first time and made quite an impression. Their 1906 model No. 4 Chicago Machine can make three blocks at one time, each 8 inches by 32 inches. Mr. J. W. Sanderson personally superintended the exhibit. He had a small army of assistants headed by that noble veteran, General C. B. Foster. Others in the party were Chas. E. Nicoud, who is the draughtsman for the company and W. F. Roney and W. S. Farrar.

Among the prominent machine men was Mr. W. K. Phillips, of the Phillips Cement Stone Co., 705 Oakwood Avenue, Columbus, Ohio. Mr. Phillips is the inventor and owner of the Phillips Continuous Concrete Mixer, one of the newest and best mixers that have appeared on the market. His mixer is the result of practical experience extending over a period of several years. Mr. Phillips first constructed a mixer for his own use which has proved so successful and so unlike anything else that he was persuaded to manufacture them and place them on the market. One of the principal features is the ease with which it can be cleaned.

The Coltrin Manufacturing Co., of Jackson, Mich., had a display of their machines in the convention hall. They showed their 1906 model face down machine which makes hollow blocks all lengths and widths, also, circles, octagon, hexagon, veneered, crown molding and many fancy blocks and water tables. They also exhibited their Boos automatic brick machine which makes standard brick plain or rock face, designed especially for facing the brick. Both of their machines were successfully demonstrated by Messrs. George Merrill and C. C. Helling who had charge of the exhibit.

The Ideal Concrete Machinery Co., of South Bend, Ind., had one of the largest and most complete displays at the Freie Gemeinde Hall. Mr. Frank A. Borst, the president of the company, was in charge of the exhibit assisted by Mr. George B. Pulfer, the vice president and general manager, Mr. Mentor Wetzstein, secretary and treasurer, and an able corps of assistants consisting of Messrs. S. L. Kelly, F. J. Fitzsimmons, W. A. Stewart, C. D. Higgins, J. W. Cooper, A. M. Rosick and P. D. Tall. They had several machines in actual operation, among them the "Ideal Special," which was exhibited for the first time. The floral and electrical decorations were very handsome. Rulers were distributed as souvenirs and were much sought after.

The Reading Brick Machinery Co., manufacturers of brick machines and concrete mixers, of Reading, Pa., had a display in the Freie Gemeinde Hall. Mr. D. P. Sanders, the general manager of the company was in charge of the exhibit. Mr. Sanders celebrated his 67th birthday on January 11, during the midst of the convention. He received the congratulations of his many friends who were aware of the fact of his birthday. Mr. Sanders is as active as a young man, and would never be suspected as being a day over fifty. Rock Products joins in the general desire expressed by his friends, that he may enjoy many more years of health and prosperity. The Sanders brick machine which is made and sold by the Reading Brick Machinery Co., is one of the simplest and one of the most rapid of the brick machines.

The Appleton Sewer Works, Appleton, Wis., exhibited in the Freie Gemeinde Hall their new "Easy Lifting Device." Messrs. John Driscoll, M. K. Gochbauer and W. H. Fisher were in charge of the display.

The Knickerbocker Co., Jackson, Mich., had one of their "Coltrin" mixers on exhibition. It is a very practical machine. Mr. R. B. Coltrin the inventor of the machine exploited its virtues to the crowd.

W. H. Caskey, of the Cleveland Car Co., West Park, Ohio, was on hand and exhibiting a sample car especially designed to take care of the requirements of the manufacturers of concrete blocks and brick.

Mr. Eber S. Peek was on hand representing the Stringer Machine Co. of Jackson, Mich. Their new 1906 machine is one of the best on the market. Mr. Peek was one of the most popular delegates at the convention.

The Indestructible Post Co., of Chicago, was prevented from making a showing, the first day because their exhibit was delayed by the railroad company. However Mr. F. W. Eaton, their clever representative, made up for lost time when it finally did arrive.

Mr. E. W. Thompson, Niles, Mich., showed one of his new wet process building block machines in the basement of the Freie Gemeinde Hall. This machine is being manufactured and placed on the market by the Niles Molding Machine Co., of Niles, Mich. Mr. Thompson is very sanguine over the results achieved with the use of his new machine.

The Queen City Brick Machine Co., Traverse City, Mich., had a display in the Turner Hall in charge of Mr. W. J. Hobbs. This is a practical hand tamp cement brick machine making ten bricks at one time. One feature of the machine is that by using inexpensive plates or dies you can make any or all kinds of fancy shaped brick at one and the same time.

The Edmonson Machine Co. South Bend, Ind., were represented by Mr. J. H. Willey, who took great pleasure in explaining the new solid two-piece wall block machine. This machine is entirely different from any other on the market. Mr. Willey said from the favorable manner in which the machine is being received he predicts a brilliant future.

The Hayden Automatic Block Machine Co., Columbus, Ohio, was represented in the Gemeinle Hall. This is one of the old established machines and was always the center of attraction for its friends. Mr. Kirk H. Brown and Mr. C. E. Ottman were in charge of the exhibit and were kept busy most of the time demonstrating the many advantages of the Hayden.

The National Building Block Machinery Co., Milwaukee, Wis., did not make a display at the convention, but extended a very hearty invitation to all who attended the convention to call at their factory and see their plant in operation. Mr. J. P. Sherer, who was a member of the local committee, is the manager of this company, and H. T. Behrle was one of the most able assistants.

The South Bend Machine Co., South Bend, Ind., had a display of their brick machines in the Turner Hall. Their demonstrations were in charge of Messrs. A. P. Starr, E. Snell, H. H. Hutson and George Braun. Quite a lot of interest was manifested in the machines by the spectators, some of them holding watches developed the fact that twenty bricks could be pressed and removed from the machine in twenty-five seconds.

The Dever Cement Tank and Silo Co., Cassopolis, Mich., were on hand in the main hall. Their display was in charge of Messrs. O. A. Dever and E. K. Black. The Dever cement tank mold which they had on exhibition has proved its merits. With it you can build a cement tank or any dimensions as the molds are adjustable. By it you can construct a tank either in a circular or oblong form. The extensions may be put in at the side so as to make an oblong tank or they may be put in at each quarter joint. They also make ball and spindle molds.

The Perfection Block Machine Co., Minneapolis, Minn., had a display in the main hall under the supervision of Mr. M. K. Sawyer secretary of the company. The "Perfection" while not a new machine on the market is yet a departure from the general run of machines. It has taken its place

in the front rank among the really first-class machines. Mr. Sawyer made many friends for his machine by the admirable way in which he described it with samples of the product.

J. A. Soderstrom, Sac City, Iowa, exhibited the Sampson, one lever cement pressed brick machine in the West Side Turner Hall. It makes two bricks at a time and has a capacity of 2,000 to 2,500 bricks per day for operation by one man. Mr. Soderstrom personally superintended his exhibit, which attracted considerable attention on account of the ease with which it is manipulated as well as the evident superiority of the bricks which it makes.

The Automatic Building Block Machine Co., Jackson, Mich., had a very interesting display of their machine in the Freie Gemeinde Hall. The exhibit was in charge of Messrs. W. T. Smith, J. Hunter, R. Schullinany, L. McGowan, P. M. Wolff, L. H. Scott, C. F. Scott and M. J. McGowan. Their machines are thoroughly automatic in every particular and large crowds assembled to watch the machines operated. This is a well-known concern and their exhibit attracted no end of attention and not a few buyers.

The Chase Foundry and Manufacturing Co., Columbus, Ohio, had a very interesting display of industrial cars and tracks on exhibition in the main convention hall. Of course, in the limited space at hand, it was impossible for this firm to adequately make a display, but cars and trucks especially adapted for the use of cement block and brick men were shown. They are well-designed, practical and simple in construction. The exhibit was in charge of Mr. S. M. Chase, secretary of the company.

The Municipal Engineering and Contracting Co., Chicago, Ill., had several of their cube concrete mixers on exhibition in the front of the main hall. The Cube Concrete mixer is well-known as a mixer that has no inside. You never have to pound it as it makes a perfect concrete mix in fifteen revolutions. The display was in charge of Messrs. Iver R. Johnson, C. E. Bathwick and T. M. Meek, who explained the machine in detail to the visitors. They showed a new 1906 mixer and also a hoisting machine.

The Mandt-Powell Concrete Machinery and Foundry Co., Stoughton, Wis., had their display at the Republican Hotel. They had quite an elaborate showing of their machines and products. They presented each visitor with a unique imitation of a well filled bank book. These souvenirs became very popular with the visitors who took great pleasure in flashing their imitation "roll." The concern was formerly the Mandt Cement Block Machinery Co.

The Century Cement Machinery Co., Rochester, N. Y., had their display downstairs in the Freie Gemeinde Hall. Their machine is called the "Hercules" and an admiring crowd watched the operations of their 1906 model which makes two stones on one machine at one and the same time, thus saving an immense amount of labor and time. Quite a nice display of ornamental blocks was also shown. The exhibit was in charge of Messrs. A. T. Bradley, Ely Roberts, Lewis Kuster, George Abbott, C. R. Lehrock, O. D. Tiffany, Robt. Siebert, W. O. Williams and John N. Rauber.

The Standard Sand and Machine Co., Cleveland, Ohio, had an exhibit in one of the rooms adjoining the hall in which the proceedings were held and were prevented from demonstrating their machine while the convention was in session. This is a one lever machine which has more capacity than any other block machine on the market, so the makers claim. It is a face down block machine and molds the blocks with one half cores running from end to end at top and bottom, also at either end, so when the blocks are laid, they make a hollow wall with cores running both horizontally and perpendicularly. The exhibit was in charge of Messrs. R. L. and J. W. Boughton.

The Peerless Brick Machine Co., Minneapolis, Minn., had on exhibition in the Turner Hall one of their up-to-date "Peerless" brick machines which makes ten brick at a time. It is claimed by the manufacturers of this machine that it is the simplest, strongest, cheapest and best machine on the market. There was always a large crowd around the exhibit as the ease with which the brick are made on the machine catches the crowd. Mr. L. V. Thayer, the president of the company, was personally in charge of the exhibit and was

assisted by Mr. Patrick Murphy. Mr. Thayer sold a large number of his machines during the convention.

The Winget Concrete Machine Co., Columbus, Ohio, had a very complete display of their latest machines. Their 1906 model shown for the first time attracted considerable attention. This machine has the great distinction of being the only universal machine on the market. It is universal because it perfectly combines all the three different kinds of machines into one. It makes all the things the other machines make and a number of things they cannot make, so its inventor claims. It is firstly an upright machine, secondly, a face down machine, and thirdly a two-piece machine. The exhibit was in charge of Mr. J. F. Angell assisted by Messrs. D. T. Kraner, A. Clark, and E. B. McDowell. They presented each visitor with a handsome memorandum book.

The Miracle Pressed Stone Co., Minneapolis, Minn., was represented by a great display of its well known line. Mr. O. U. Miracle was personally in charge of the exhibit. Everybody knows Miracle as he was one of the first to get into the business. He was kept busy explaining various points about the Minneapolis convention. Mr. Miracle is president of the Northwestern Cement Users' Association and is very proud of the progress they have made. He persuaded several of the exhibitors to go to Minneapolis. Mr. E. K. Winne is the sales manager for the state of Iowa and furthermore enjoys the distinction of being the youngest member of the Iowa State senate. The Senator is a jolly good fellow and made many friends at the convention.

One year ago when the convention met at Indianapolis, there was but one cement brick machine on exhibition, that of Seaman's Cement Brick Machine Co., Grand Rapids, Mich. So the Seaman's machine is one of the pioneers of the industry and has stood the test of time. This machine is one of the simplest on the market, in fact, its simplicity won it fame, and will continue to make it always a popular machine with the cement brick manufacturer. There are thousands of the machines in actual daily use. Mr. C. Marjman was in charge of the exhibit and easily demonstrated the fact that several kinds of plain and ornamental brick can be made without the loss of time or extra expense.

The Stevens Cast Stone Co., Chicago, Ill., had a very elaborate exhibit under the supervision of Messrs. C. W. Stevens and G. W. Tainter, Jr. Their display is always of great interest as they show ornamental pieces, caps, columns, balustrades, railings etc. Litholite, as this stone is called, has several thousand buildings standing as indisputable evidence of its success. Uriah Cummings has said, "What the Bessemer process is to the steel industry, the Stevens process is to the cement industry." Some of the pictures shown during the meeting contained examples of what can be accomplished by the use of the Stevens Cast Stone models in an ornamental way. It has been used successfully in Carnegie libraries, churches, schools, banks, and other public buildings all over the United States and Canada.

The Harmon S. Palmer Hollow Concrete Building Block Co., Washington, D. C., had a display on the lower floor of the convention hall. Mr. Palmer's exhibits always attract attention at any convention. Mr. Palmer was personally in charge of his exhibit and had as his assistants Mr. R. J. Schwab, Mr. J. D. Wood, Mr. C. F. Childer and Mr. H. H. Swann. Mr. Palmer when interviewed said: "There is no doubt that this convention will be of increasing interest and lasting benefit. A better representation of intelligent and practical men could not be found, and the evident aim is to learn and advance the industry. This is clearly shown by the determination to have better blocks and the best machines. The quality of stone, as shown by specimens, seem to be advancing as well as the adaptability to machines to better cooperate with the architect. The radical departure from old line rules of construction is very apparent and none realize it more than the architects. The transition cannot be checked and it must be prevented from going too fast. Just let the general architect keep quiet for only a short time and his vision will expand by the wonderful product that can be produced from machines whose geometrical qualifications are what they should be."

MINNEAPOLIS CONVENTION.

A Warm Welcome to Cement Users in the Cold Northwest.

EXCELLENT EXHIBIT FEATURE ATTRACTS MUCH ATTENTION.

"It is my desire to give you all the heartiest of welcomes, for you are the modern builders of modern cities." So spoke Mayor D. P. Jones in his welcome to the second annual convention of the Northwestern Cement Products' Association held at Minneapolis on the 17th, 18th and 19th of this month. The opening session began at 2 o'clock Wednesday afternoon when President O. U. Miracle loudly rapped for order with a handsome gavel appropriately moulded from American Portland cement. It was after a few well chosen words of greeting that the president introduced Mayor Jones who proceeded in a happy way to cheer the delegates and make them feel at home in the city of Minneapolis. Mr. Jones proved himself far more than a mere flatterer, for in his kind greeting to the cement users, he introduced some statistics to show the advancement of the cement industry, and among other things said, "In 1904 Minneapolis had only twenty-two buildings of fireproof construction, of which half were concrete. In 1905 we have added over thirty structures to this list. This is the concrete age, for we are beginning to appreciate the value of cement and its products." This address closed amid loud and generous applause.

HON. LEE STOVER SPEAKS.

The regular proceedings of the convention began with a paper on, "How Conventions Can Help Us," by Hon. Lee Stover, of Watertown, S. D. He reviewed the cement situation generally from Alpha to Omega, and many of his utterances contained little darts of pertinent advice which he delivered in a very earnest manner. "Upon the success of the cement user," said Mr. Stover, "depends the success of the manufacturer of cement and machines, and it is for them to eliminate sufficient selfishness from their demands to allow the user a fair profit." He contended that the greatest opposition to the success of the cement user came from within the ranks of the business, and this convention should endeavor by all means to rid the industry of all unreliable and irresponsible parties, who, by inferior methods and in other ways, work real harm to the progress of the business.

Mr. Stover credited the machine men with much of the success of the cement industry, and especially the block feature.

Cement users should be nourished by the manufacturers of cement also in order to promote and maintain the growth of the industry so impossible without their assistance.

The subject of coloring for blocks was also discussed, and Mr. Stover said that as yet he had obtained no permanent coloring for concrete. He then declared that the use of stamped tin siding, plain faced blocks and those which imitate stamped tin siding, used so extensively through the country, must be stopped, for it is a death blow to any attempt to sell blocks resembling them. A block upon which it is not necessary to use lath and one without efflorescence, Mr. Stover declared to be an absolute need.

After criticising architects for their unreasonable demands upon block makers, and citing an instance in his own experience where an architect demanded that he move a row of windows one-eighth of an inch, Mr. Stover closed his speech by paying a tribute to the usefulness of conventions, and predicting great good resulting from the second annual convention of Northwestern Cement Products' Association.

ARTHUR N. PIERSON, OF NEW YORK.

One of the shining lights in the ranks of cement users who always manages to supply an abundance of information, is Mr. Arthur N. Pierson, of New York City. It has been intimated that his qualifications as a leader in experience meetings in the conventions recommend him as a first class Methodist exhorter. At any rate Mr. Pierson is a forcible and able speaker. The subject of his speech was, "Some of Our Troubles and How They Come About." He began by defining three causes of failure in the block business, viz.: The failure of the block manufacturer to appreciate the merit and quality of his product, and to meet other materials on the market with judicious argument; failure on account of the unintelligent manufacture, and last, moral failure or lack of integrity. In beginning his review of these classes Mr. Pierson said that the rock business was not exempt from some people who had no element of success in their nature. All trades and business contain this kind of people.

The manufacture of building blocks, in a strict sense, a constructor, who must not only be endowed with the power to convert his ideas into tangible shapes, but must have also a capacity for marketing his product intelligently, secure reasonable compensation and living profits. The circulation of misleading statements in regard to machines and aggregates published by unscrupulous machine makers, Mr. Pierson characterized as most harmful, and pleaded for reformation along these lines.

Under the second class the speaker stated that many of the failures from lack of intelligent manufacture resulted directly from an insufficient knowledge of the important feature of selecting and mixing aggregates.

He advocated great care in the selection of the ingredients of a block, and stated that when such care was exercised a mixture of one to five was very satisfactory. In choosing aggregates Mr. Pierson recommends starting with 25 per cent gravel or crushed rock, known as one-half inch, and then grade down with a proportion of smaller stone or gravel, to compose at least 60 to 70 per cent of the entire aggregate. By adding one-half coarse and one-half fine sand a mixture could be obtained having greatest tensile strength, and making a block of highest density and water-proof qualities.

The subject of mixing, the speaker declared to be one of most vital importance to which insufficient attention has been given by block men. On account of improper mixing of concrete much cement has been wasted, not becoming an active factor in the constitution of the aggregates. To obtain the best results Mr. Pierson recommended the use of a machine mixer as being far superior to the hand method. He next touched upon the importance of tamping, and spoke at some length on methods of curing blocks, emphasizing the advantage of keeping the blocks in a moist atmosphere for at least a week after manufacture. Concluding, Mr. Pierson said, "I believe it hardly necessary for me to say that integrity and honesty must be employed with every feature of our undertaking. Let us remember that chickens come home to roost; that honesty is the best policy as well as the best policeman, and under most fortunate circumstances let us remember that it is a long road that has no turning, and don't chance anything; know what you are doing and do it with every bit of integrity you can put into it. These principles employed and reasonable caution observed, I have no fear as to the future of the cement block use."

WEDNESDAY EVENING SESSION.

Promptly at 8 p. m. the evening session of the first day was called to order, and President Miracle in his usual bright and graceful style, delivered the president's annual address as follows:

PRESIDENT'S ADDRESS.

The development of all lines of business has demonstrated beyond question the necessity of organization and co-operation. We come together in these meetings not only to listen to the able papers which have been prepared, but also to discuss the same, and the measure of benefit we have received will depend upon the thoroughness with which these papers are discussed, examined and analyzed.

Viewing the theories which are advanced here in the light of our personal and field experiences, we can select the best information, and each apply that which is best in his own individual case. Our first and greatest purpose is, of course, to promote the general welfare of this great industry, and place this material before the public in its best light, and to inform ourselves the best and most economical methods of manufacture which will result in a product worthy of the confidence of the public whom we wish to interest as buyers. In order to get the best results we must take up each of the special branches of this industry and discuss them thoroughly and separately. We have, therefore, outlined our program to cover re-inforcement and monolithic work, concrete blocks, sidewalks, and general street work.

Getting down to our own organization here, which we have been pleased to call the Northwestern Cement Products Association, I wish at this time to give you a little inside history and tell you some of the difficulties that this association has met with during its year's existence. Last year we had a most excellent meeting, and plans were laid out for a great year's work. The work was divided into proper divisions and subdivisions; competent committees were appointed to carry on this work, but a very important feature of this organization was overlooked at that time—that of collecting dues from each individual member present during the first meeting, in order to create a fund for the purpose of carrying out the important work laid out. Our secretary sent out innumerable notices asking those who attended to remit the small sum of \$2.00 and become members of this association, but the responses were altogether too few, so that when it came time to get some of the heads of the different committees together, your association was then entirely without funds. Your officers determined at that time (which was about June 1) that the best thing to do would be to let the matter run along until near time for this meeting, and your president was left to his own judgment to devise ways and means to provide for this meeting.

About two months ago your president issued a call for this meeting, knowing at the time that there was not one dollar in the treasury to liquidate any expense which might occur in making preliminary arrangements for this meeting. A short time after he also wrote fifteen personal letters to cement users, cement dealers, and cement engineers located in the Twin Cities, asking them to attend a meeting at the Nicollet Hotel one evening in November. Out of fifteen, fourteen responded and were on hand to attend the meeting. The condition of the finances of the association were laid before these gentlemen present, and your president suggested that all make an advance of sufficient funds to the association to inaugurate the work necessary to procure this meeting. They responded to a man; each one advanced \$25.00 to create a fund for postage, printing, advertising and a paid assistant secretary, and the other necessary expenses incident to promoting the interests of this meeting, so it is to these gentlemen that you are indebted for any measure of success which this meeting may attain. At this meeting, committees were appointed from those present upon program, transportation, exhibit room and convention hall, and their work has been executed in perfect harmony, with the result that I believe this will be the most successful convention that has ever been held since the inception of this industry.

It is true that a large part of the immediate expense of this organization is borne, and justly borne, by the exhibitors, who pay liberally for their exhibit space. These exhibits are a necessary feature of any convention. True, the exhibitors are benefited by this exhibit—they expect to either sell enough stuff or do enough advertising to pay them for the expense of making it.

I also wish to have it distinctly understood that the floor of this convention hall is not the place to advertise any man's particular machine, block or system. The advertising feature belongs to the exhibit hall, and will not be tolerated upon the floor of this convention because by this method, and by this method only, can a fair and impartial discussion of the general merits of the proposition in hand be carried on, and any member attempting to violate these suggestions will be promptly called to order.

As I have said before, the great growth of this industry has made it a very inviting field for the investor. Many have gone into the business with little idea of its requirements, but they have been thorough students of the proposition, and only by a continuation of these studious efforts can we hope to maintain the industry on the high plane to which it belongs. Many have also made serious mistakes; both mistakes of commission and omission. These mistakes have brought on many criticisms—some just and unjust. These objections made are being rapidly and readily overcome. One of the most serious objections, and one at the same time most readily overcome, is that of appearance of the concrete block in the building, and it comes most forcibly from the architect, who is naturally slow to leave the well-trodden paths of established practice for exploring what is to him, an unknown field. His worst criticism is the everlasting, abominable rock face block which you have all made, and which in construction resembles the cheapest sheet-iron effect. Nothing is easier than for you to get away from this uniform effect. No material is so easily susceptible and responsive to the artistic touch as concrete, and I trust you will look more to that end of the business in the future. Quality, of course, comes first, and must be considered above all. The architect has already discovered that the material is already being used, and is ready to consider it for his wants, and it is up to you to produce an article that will fill his wants.

During the past year, great progress has been made in securing just recognition for this material by the public; by the insurance people; by the railroads and by the United States government. The public demands this material in better and more imposing structures than ever before. The railroads have recognized and classified this material and machinery used for its manufacture in its freight rates. The United States government has deemed the matter of sufficient importance to appropriate \$50,000.00 for experimental work in the laboratories of the U. S. Geological Survey at St. Louis. This experimental work is now being directed by the president of our national association, Mr. Richard L. Humphrey. In conjunction with these experiments and tests, Mr. Humphrey has the co-operation and is working under suggestions from the American Society of Engineers, the American Society of Testing Material, the American Society of Cement Manufacturers, the National Association of Cement Block Machine Manufacturers, the Testing Department for the National Board of Underwriters, and the National Association of Cement Users, and in fact has called to his assistance information from every available source, and I have great confidence that the result of this will be very highly beneficial to the industry in general.

I wish to suggest at this time that a similar resolution to the one passed in Milwaukee, be proposed and adopted at this meeting, and that each and every one of you take occasion to write to your congressman and United States senator a personal letter, drawing their attention to the necessity of a continuance of these experiments and a liberal appropriation by Congress for that purpose.

I regret to say that many machine manufacturers have placed in the hands of their customers much unreliable information in the way of specifications and estimates of cost of material. In order to get this matter upon a uniform basis, your president brought it up at the meeting of the National Association of Machinery Manufacturers held in Chicago last June, with the result that a committee on standard specifications were appointed by the association, of which he has the honor of being chairman, and this committee has just finished its first progress report, which has been placed in the hands of all machinery manufacturers, and they have been urged to use these specifications in basing their estimates upon the cost of production of what their machines turn out.

These specifications will be read to you during the meeting.

In conclusion I wish to thank every individual of the local board who has so kindly assisted plans

for this meeting, and have so liberally contributed funds for the purpose of maintaining this organization, and I urge that each of you become full fledged members before leaving the city.

President Miracle's address was well received by his hearers who manifested their appreciation by generous applause.

Following Mr. Miracle, Mr. Henry Longscope, of Philadelphia, presented a paper entitled, "Concrete, Its Uses and Abuses," and illustrated his lectures with excellent stereopticon views. Mr. Longscope entered into a general discussion of the preparation of concrete and the curing of cement blocks, declaring that too much attention could not be paid to the proper mixing of the aggregates. He advocated a medium wet mix. In reviewing the concrete situation in his city, the speaker defended the stringent regulations placed upon block and concrete construction there is a needful prevention against unscrupulous work.

Mr. Longscope is a good authority on the construction of concrete piles and in answering questions directed to him he gave the comparative cost of cement piles to wooden at one and one-half to two times the cost of the latter, a proportion which changes materially when applied to shore piling and excavation. However, cement piles are everlasting, indestructible and require less piles in a given area than wood. The mix is usually one, three and five or one, two and one-half and



O. U. MIRACLE, PAST PRESIDENT OF THE ASSOCIATION.

five, stone of one and one-half mixed sloppy wet, not tamped but agitated into a settled position. Mr. Longscope is exceedingly well versed in all sections of the concrete industry and his paper was highly instructive to his listeners.

A SOCIAL SESSION.

At 9 o'clock the convention adjourned to attend a social session where the hosts were the Builders and Traders' Exchange. This entertainment held at the Kasota building was a very delightful affair and the delegates expressed themselves as being royally treated by the gentlemen of the Northwestern metropolis.

THURSDAY MORNING SESSION.

The presentation of standard specifications for hollow blocks as compiled by a committee of the National Machinery Manufacturers was the cause of a great deal of discussion Thursday morning. President Miracle read these specifications after which section after section was carefully argued by the convention. Some new information was brought to light during this parliament. Mr. Olaf Johnson, of Estherville, Iowa, stated that blocks should not be laid dry as they would absorb the moisture of the mortar. He suggested a thorough sprinkling of blocks before placing them in the wall. The discussion revealed different methods of cleansing sand or pebbles of adherent clay, shale, etc. Some speakers said they used a drum which revolving slowly knocked all lime or clay free from the aggregate and was easily washed

away on a flume or if perfectly dry, blown away. By using a stream of water over a graded screen others had found that the fine sand will drop through the screen into a receptacle below while the lighter substances will be washed away. Upon the power of the stream depends the weight of materials that can be washed away. Among other things it was the sense of the meeting that blocks cracking in the making process should not be thrown back and material used over, as the mixture had at that time weakened on account of the cement beginning to set, also that a mortar of the same richness as the block should be used in laying the latter in order to make the joints as waterproof as the body of the wall. A mixture of equal parts of lime and cement was formed.

Although a feeling was expressed that block coloring had not reached perfection some gave testimony of satisfactory results from the use of coloring materials where great care was taken in the curing, keeping the blocks moist by gentle spraying and in a damp room during the curing. After the conclusion of this open discussion the convention adopted the standard specifications for hollow blocks which will appear in our next issue.

Mr. John C. Moore, of Chicago, who was to have read a paper on "The Rational Interpretation of Cement Tests" in this session, was absent and this feature of the convention was omitted.

THURSDAY AFTERNOON SESSION.

Beginning this business session a motion was made and carried that committee membership hereafter be limited to three. As the executive board provided for the annual conventions, President Miracle offered a suggestion that its membership be confined to the Twin Cities and vicinity. Mr. Stover succeeded in carrying a motion to the effect that Mr. Miracle be empowered as a committee of one to draft such amendment to the constitution as was necessary to comply with this suggestion.

The committee named at this meeting were: Nominations—L. L. Bingham, E. H. Cobb, Lee Stover; place of meeting—J. T. Summers, William Hurst; resolutions—Ed E. Smith, Mr. Laughlin, G. A. Welch.

A paper on "The Concrete Block Industry of the Future as Predicated by Past Experiences," was presented by Mr. A. P. Melton, of Minneapolis. This paper will be printed in full in a future issue.

At the conclusion Mr. Melton answered many questions which manifested the general interest taken in his paper.

MR. WUNDER TALKS ABOUT CONCRETE.

One of the features of the afternoon session was a good practical talk on concrete by Mr. John Wunder, of Minneapolis, who is a very prominent constructor in that city and who has perhaps built more structures from concrete than any other contractor in Minneapolis. He told of several of his largest concrete jobs and related some of the obstacles encountered and how he overcame them. In speaking of the construction of the Northwestern Knitting Works building he said that the weather was very cold while the work was being done on the floor and roof slab of the structure and that he used thirty salamanders, using coke for fuel and the results obtained were very satisfactory, for the slabs dried were very clean, smooth and impervious. The carbonizing effect of the coke and the heat together served to glaze the slab. A mixture of soap and water accompanying such heat, Mr. Wunder declared had the same effect. In his concrete mixture for this job 13 to 15 per cent water was used. In this same connection the speaker said that he believed that coke and steam could be used to good effect in the proper curing of cement blocks and if the same effect was attained as in his experience with concrete the blocks manufactured would be practically water proof and thoroughly cured.

Mr. Wunder's talk was well received and his remarks applauded by the convention. When he had finished, countless questions were asked him in regard to block work and he very graciously answered all of them. Among the interesting points brought out in this quiz where the speaker's ideas on the kind of aggregate when he stated that he believed that crushed gravel was a much more valuable material to be used as one of the aggregates that whole gravel of the same size as the crushed pieces. In speaking of the curing of blocks he expressed the opinion that a great many block manufacturers possibly applied water too freely in the curing process and that was due to this over abundant supply of water that efflores-

cence showed itself in the finished product. He advocated keeping the block damp by gentle sprinkling and favored the use of steam as it penetrated the block with moisture without disturbing the general mixture, which too much water is apt to do, while too little water will not give the cement a chance to become completely active.

A TALK ABOUT SIDE-WALKS.

The session was concluded with a very enthusiastic discussion relating to sidewalk construction which was led by Mr. Peterson, of Wahpeton, N. D., who presented some very interesting information along this line. In speaking of this kind of construction Mr. Peterson stated that he had laid side-walks upon the bare ground which never afterward showed any sign of heaving. He advised the use of a richer material, a mixture of gravel with a larger proportion of cement than had been customary in the case, and for the face less cement than is generally used. He constructs walks with a center seam and packs hard on the sides and states that frost will cause the center to rise but it will again resume its original position.

Another thing which the speaker advised was that no cement walk be laid so as to come into direct contact with a stone wall, but tarred paper should be placed between the sidewalk and the wall. To profit from the experience of others is the main feature in the usefulness of the association and the speaker proceeding on these lines took occasion to warn sidewalk contractors present against village contracts without having stipulated in the contract or agreement from what funds of the town the provision was to come. It seems that Mr. Peterson has had some embarrassing troubles of this kind and desired to prevent his friends from meeting a like fate. In an extension of walks of one hundred feet long or more expansion joints were declared necessary. It was also stated to be more satisfactory in building walks to construct the curb and gutter last as this seems to allow for expansion when frost attacks the walk, while building the reverse tends to cause frost to throw the curb out of line. A great deal of interesting instruction in this important branch of the cement industry was brought out in this discussion.

EVENING SESSION, JANUARY 18.

One of the features of the convention was the reading of a paper by Mr. C. A. P. Turner, of Minneapolis, on the subject of "Reinforced Concrete," which was illustrated with excellent stereopticon pictures of handsome and durable structures. The evening was very profitable as well as interesting to every one in attendance. Mr. Turner presented this paper at the National Convention of Cement Users at Milwaukee the week before and was well received. In the report of that meeting which appears in this paper space has been given to the reproduction of this address for the benefit of our readers who did not attend either of these meetings.

MORNING SESSION, JANUARY 19.

At this time the work of the convention was nearly completed and for this reason a number of delegates paid less attention to the meetings and devoted more of their time to viewing the handsome exhibit features which continually attracted a large crowd next door. In this morning's session Mr. Miracle who had been elected for the purpose introduced a resolution which created a convention board of twelve members, residents of Minneapolis and St. Paul who would have complete management of all annual conventions. This resolution was incorporated into section 3 of the by-laws.

The committee on resolutions recommended a vote of thanks to all those who had contributed in making the convention a success and also followed the lead of the Milwaukee convention in asking that a resolution be passed asking Congress to increase its appropriation for the purpose of making concrete tests, the same movement in which President Humphrey, of the National Convention, is so interested. These resolutions were adopted unanimously. A very important feature also in connection with the work of this committee was the adopting of a request that Congress remove or lower the tax on alcohol in order to provide a cheap and satisfactory fuel. The success of this movement means a great forward step for the cement industry and every interested man should urge his congressman to agitate this matter.

The officers elected for the following year are: President, C. A. P. Turner, Minneapolis; vice presidents: Cement and aggregates section, A. H. Laughlin, Lisbon, N. D.; machine and equipments section, O. U. Miracle, Minneapolis; cement block section, Lee Stover, Watertown, S. D.; concrete, other than blocks, John Wunder, Minneapolis; engineers and architects, E. W. Dow, Sioux Falls, S. D.

Treasurer J. M. Hazen made his report which showed that at the opening of the convention, a balance of \$89.35 was in the treasury.

Secretary George A. Hughes also submitted his annual report and in this connection Mr. Hughes is to be highly commended for his able and efficient service rendered to the association. In appreciation of his ability and efforts in that capacity a motion was unanimously carried recommending to the executive board the re-election of Mr. Hughes as secretary. In a subsequent meeting the board complied with this request.

"The Future of the Concrete Industry," a paper by Mr. D. N. Harper, of Detroit, Mich., and one on "Cement Tile for Farm Drainage," by Mr. L. L. Bingham, of Esterville, Iowa, were on the morning's program.

THE LAST SESSION.

It seemed at this time that the exhibit hall was the big show for the session of this afternoon was very slightly attended. It may be stated here that the exhibit feature of the Minneapolis Convention was of no minor importance and that it received its part of attention from the delegates. The program for the afternoon consisted of a paper by Mr. J. G. Houghton, building inspector of Minneapolis, on "Concrete Blocks," and a carefully prepared paper by Mr. J. C. McClenahan, of New York, entitled, "Manufactured Stone." This was the same address as was presented by this able speaker at the Milwaukee convention.

After considerable discussion of different subjects the second annual convention of the Northwestern Cement Products Association drew to a close.

A VAUDEVILLE ENTERTAINMENT AND SMOKER.

Although the business of the convention was over the committee on entertainment had provided more enjoyment for the delegates, and promptly at 8 o'clock they assembled to enjoy one of the very best vaudeville entertainments in which a great many well known society people of Minneapolis assisted in making the hour an enjoyable one. Notably among those appearing was Mrs. Geo. A. Hughes, wife of Secretary Hughes, who is very accomplished, and secured many encores. This feature of the convention's session was proclaimed by all to be the most entertaining of the entire meeting. When the delegates walked to their trains the next morning they found the mercury far below zero, but the thought of the royal treatment received while in the city of Minneapolis warmed their hearts.

THE ATTENDANCE.

Washington, D. C.—J. D. Wood.
Chicago, Ill.—Wm. Seafert.
Hillsdale, Ill.—Butzer Markee.
Emmettsburg, Iowa—Jos. Schenk.
Esterville, Iowa—L. L. Bingham, Olaf Johnson.
George, Iowa—T. J. Coakley.
New Hampton, Iowa—W. E. Fox.
Mason City, Iowa—W. W. Naramore.
River Falls, Iowa—F. M. Ulrich.
Sheldon, Iowa—W. H. Weber.
Waterloo, Iowa—J. E. Brigge, Lauritzen Bros., B. D. Ryan, D. P. Faus.
Alexandria, Minn.—J. L. Alton.
Austin, Minn.—F. I. Crane.
Balaton, Minn.—F. S. Bartlett.
Claremont, Minn.—Edw. F. Marshall.
Crookston, Minn.—F. C. Mitchell.
Detroit City, Minn.—F. B. Chapin, J. H. Whittemore.
Elmore, Minn.—C. F. Henkel.
Fairmont, Minn.—Fairmont Stone Co., F. D. Gould.
Glenwood, Minn.—Charles P. Johnson, T. M. Thompson.
Graceville, Minn.—W. C. Hudson.
Hopkins, Minn.—Andrew Justice, Louis Lundquist.
Hutchinson, Minn.—Nels Madsen.
Lake City, Minn.—L. S. Lutz, Martin Olson, Wm. E. White.

Litchfield, Minn.—John A. Engstrom, O. J. Wicklund.

Little Falls, Minn.—G. V. Clark.
Mankato, Minn.—E. H. Bassett, Fowler & Pay.
McIntosh, Minn.—Anton Jensen, Simon P. Simonson.

Minneapolis, Minn.—Nathan Butler.
Minneapolis, Minn.—C. Jensen, N. Lundquist, Model Cement Stone Co., Medium Horton B. Co., Wm. N. Box, A. P. Melton, Minnesota Crushed Stone Co.

Montgomery, Minn.—M. V. Havel, J. J. Taraba & J. W. Shirna.

Montevideo, Minn.—W. J. Faus, Peter H. Ondahl, T. T. Bodeberg, H. L. Bregert.

Moorhead, Minn.—Joseph V. Godfrey.
Ortonville, Minn.—J. A. Anderson.

Owatonna, Minn.—N. F. Peterson, John Reasch, Simon Williamson.

Plainview, Minn.—A. C. Woodcock.
Rochester, Minn.—Pallock & Riedell.

Sacred Heart, Minn.—Anderson & Turner.
Sandstone, Minn.—T. R. McCarmic.

St. Charles, Minn.—L. N. Howe.
St. James, Minn.—Aiben Anderson.

St. Paul, Minn.—C. O. Andrews, Maskell Ewing, James Mechan, Jr.

Sleepy Eye, Minn.—Jens Jensen, Sleepy Eye Paving Co., Fred C. Koehne.

Springfield, Minn.—P. C. Hansen.
Stillwater, Minn.—C. I. Carlson.

Thief River Falls, Minn.—Joseph Lang.
Wadena, Minn.—L. L. Lund, W. J. Hampson.

Worthington, Minn.—E. W. Cutler, L. E. Fitch.
Bozeman, Mont.—P. L. Vreeland.

Glendive, Mont.—Wm. Hurst.
Elgin, Neb.—H. G. Eneide.

Norfolk, Neb.—M. Endras.
Omaha, Neb.—C. D. Russell, Omaha Concrete Stone Co.

New York, N. Y.—Arthur N. Pierson.
Anamoose, N. D.—W. D. Frankhauser.

Carrington, N. D.—J. P. O'Leary, L. F. O'Leary.
Cheyenne, N. D.—J. V. N. Sundberg.

Devils Lake, N. D.—Louis Hansen.
Edenberg, N. D.—Peter P. Lee.

Ellendale, N. D.—W. T. Full.
Enderlin, N. D.—J. R. Grauff.

Fargo, N. D.—Gilbert W. Haggart.
Grand Forks, N. D.—Otto Babcock, (Pembina Portland Cement Co.), R. E. Roberts.

Havana, N. D.—L. W. Holdes.
Hope, N. D.—Standley & Bergman.

Jamestown, N. D.—G. S. Williams, George R. Jackson, Henry Larson.

Lisbon, N. D.—A. H. Laughlin, (Wickstrom & Seversen.)

Mandan, N. D.—W. Simpson.
Maxbass, N. D.—E. B. Loucks.

Minot, N. D.—Eugene Teutsch.
New Rockford, N. D.—Chas. F. Culp, H. W. Clark.

Park River, N. D.—E. Herwick, P. M. Bye.
Velva, N. D.—H. C. Musselman.

Wahpeton, N. D.—A. G. Peterson.
Fort Francis, Ont.—A. E. Cline.

Aberdeen, S. D.—D. S. Culbert.
Brookings, S. D.—A. R. Weaver.

Dell Rapids, S. D.—D. C. Ward.
Groton, S. D.—B. H. Green, George H. Niemeyer.

Mitchell, S. D.—G. Schuerenbrand, Adolph Schuerenbrand.

Montrose, S. D.—H. C. Nelson.
Oldham, S. D.—F. E. Peterson.

Park River, S. D.—E. Herwick.
Redfield, S. D.—Stolte Miencken.

Sioux Falls, S. D.—Henry Tripp, P. T. Connelly, J. T. Summers, (Anchor Stone Co.), A. R. Priest.

Sisseton, S. D.—J. T. Stuverud.
Watertown, S. D.—George W. Carpenter, Lee Stover, Robt. L. Eddy, E. A. Hoff.

Wilmont, S. D.—W. V. Laird & Son.
Yankton, S. D.—T. K. Lamb.

Ashland, Wis.—W. D. Hogan, Thos. Edwards.
Barron, Wis.—Ed E. Smith.

Galesville, Wis.—R. N. Kienzie.
LaCrosse, Wis.—Wm. Rehfuess.

Prescott, Wis.—Thos. Manion.
Seymour, Wis.—Herman Kleper.

Thief River Falls, Wis.—A. H. Fasel.

The Thayer Cement Block Machine Co., who make the "International" cement block machine, had one of the best exhibits of the convention.

This is a Minneapolis firm, of which Mr. George A. Hughes, the secretary of the association, is the general manager. Besides Mr. Hughes, Messrs. Thomas Holt, John Miller, William Mergner, and G. W. Papke were connected with the display and demonstrated the workings of the "International."

THE EXHIBIT FEATURE AT MINNEAPOLIS.

A bee hive, that proverbial home of industry, has been relegated to the rear, for there never was a scene of greater thrift and industry than the exhibit hall at the Minneapolis convention. Vast crowds of delegates and interested people of the city were assembled around the booths every hour in the day and until quite late at night. If exhibitors at the Milwaukee convention found cause for complaint from lack of attention it is certain that at Minneapolis their vanity would have been amply gratified.

The room for the displays was almost an ideal location. A long store building having one whole continuous glass side, furnished abundance of light, while steam heat kept the room at comfortable temperature. A great advantage over the Milwaukee meeting was the fact that all exhibitors were able to be together and no one had any advantage of position.

Mr. T. O. Axtell, vice president of the Leusch Manufacturing Co., of Waterloo, Iowa, was in charge of the exhibit of that company and was continually at work explaining the operation of the Leusch Cement Shingle Machine.

Mr. G. E. Ingersoll, of St. Paul, who is the Northwestern sales agent for the Contractors' Supply Co., had installed an exhibit of the popular Smith Mixers, which attracted much attention from all the delegates.

One of the hardest working men during the entire convention was Mr. George L. Barnes, representing the Pettyjohn Co., of Terre Haute, Ind., who had an exhibit transported from Milwaukee. While he never moved the block he was continually busy moving the machine.

Mr. F. J. Fitzsimmons, that jolly good fellow from Chicago, who was in charge of the display made by the Ideal Concrete Machinery Co., of South Bend, Ind., brought his outfit with him from Milwaukee. Much the same kind of demonstration was given at both meetings where an unceasing interest was manifested. Mr. A. L. Brown, of Minneapolis, assisted "Fitz" in the Ideal booth.

Mr. John Miller represented the Winner Block Machine Co., of Minneapolis, and explained the operation of the "Winner" mixer. The fact that the "Winner" is open and can be "seen into" makes a good argument for the manufacturers.

The Miracle Pressed Stone Co. had a very elaborate display of machines, and while Mr. O. U. Miracle was kept busy in his capacity as president and leading spirit of the convention, he had a corps of efficient men who took great care to see that "The Miracles" were pushed to the front. The exhibit was larger than the one at Milwaukee.

The Contractors' Machinery Co., of Minneapolis, exhibited the "Durable" cement block ma-

chine and attracted a crowd of interested spectators.

One of the busiest booths was that of the Anchor Concrete Stone Co., Rock Rapids, Iowa, where Anchor blocks were made one after another, for the enlightenment of a large number of visitors who continually crowded around. Mr. C. W. Bradley, the general manager of the company, was busy telling of their advantages over all other kinds. Seven other members of the firm were present and their names will be found in the regular list of attendance.

Mr. C. Whitney and Mr. A. C. Dornfeld, representatives of the Simplex Manufacturing Co., of Jackson, Mich., brought their exhibit from Milwaukee and made blocks and bricks on "Simplex" machines for the edification of large crowds. The "Simplex" brick machine was one of the most attractive features among the displays.

The Medium Hollow Block Machine Co., of Minneapolis, exhibited their "Medium" block machines and this display was a scene of great activity where Mr. Nels Erickson, the energetic proprietor, assisted by Mr. G. Stocklin, operated the machine.

Mr. J. W. Sanderson, Gen. C. B. Foster and Mr. Charles E. Nicoud, of the Cement Machinery Co., of Burlington, Iowa, brought their mammoth exhibit from Milwaukee, and succeeded in getting their share of attention. The "Positive" mixer in operation, driven by an electric motor, was one of the chief attractions in the machinery exhibit. The General and Mr. Nicoud were kept busy answering questions, which denoted the interest of the spectators.

Mr. Charles W. Stevens, of Harvey, Ill., represented the Stevens Cast Stone Co., and showed some of the excellent work made under his process. Some beautiful specimens of artificially colored stone were among his collection.

Another exhibit brought from Milwaukee was that of R. B. Coltrin, of Jackson, Mich., who demonstrated the principle of the Coltrin mixer and made blocks and brick with Coltrin machines. Mr. Coltrin had his mixer in operation and many complimentary remarks were heard concerning its operation.

The Iowa Building Block Machine Co., of Waterloo, Iowa, could have had no better representatives than Messrs. H. L. Green and J. L. Shannon, who industriously made blocks and told the visitors where they could buy the machine.

Mr. J. H. Stewart, manager of the Waterloo Cement Tile Machinery Co., of Waterloo, Iowa, shook hands with all his cement using friends and told them about his new machine for making drain tile.

Those genial fellows, Robert B. Dickinson and his uncle, John W. Dickinson, greeted delegates on behalf of the Marquette Portland Cement Co., of Chicago. Here in the home of the "Marquette" brand, a warm welcome and a good place of entertainment were offered to every member of the

association who always went away with pockets full of looking glasses, calendars, blotters, cigars and briquettes, and their minds full of "Marquette" information.

One of the most popular machinery exhibits was that of the Concrete Machine and Cement Co., Minneapolis, of which A. Brackett & Son, are the proprietors. This was a family affair because the firm was represented by Mr. A. Brackett and his two sons, C. R. and R. D. Brackett. They made a number of sales.

There is so much money in the cement products business that the Guarantee Cement and Stone Co., of Minneapolis, who are the Northwestern selling agents for the Illinois Steel Co.'s "Universal" brand gave every visitor to their booth a handsome pocket book. Couldn't understand, however, why Mr. Ernest S. Macgowan, in charge of the exhibit, should have given us one. Mr. Harvey B. Smith was also connected with this exhibit, besides Mr. A. E. Robinson who represented the "Universal" mills.

Mr. J. M. Campbell brought the exhibit of the International Fence and Fireproofing Co. from Milwaukee and enthusiastically explained the good points of the "American" mixer, which was in operation all through the convention. Fairbanks-Morse & Co., are the agents for this machine and were represented by Mr. N. C. Hickcox, of Minneapolis.

The Illinois Gravel Co., of Princeton, Ill., who are agents for the Automatic Building Block Machine made at Jackson, Mich., installed a complete exhibit and had a machine in operation. Mr. C. F. Scott is the president of the Illinois Gravel Co., and Mr. L. H. Scott secretary. Both reported good sales during the convention.

The Perfection Block Machine Co. was represented by Mr. E. W. Dow, secretary and treasurer of the company, Mr. M. K. Sawyer, N. W. manager, and Mr. W. A. Dow, general agent. Their handsome exhibit consisted of blocks made on the "Perfection" power block machine, and photographs of beautiful jobs constructed of their product. During two days of the convention this progressive firm chartered street cars to take visitors to the scene of building the new plant for the Twin City Rapid Transit Co., where the "Perfection" machine was seen in actual operation.

The Standard Stone Co. of America, New York City, had one of the largest exhibits in the entire hall. Mr. J. C. McClanahan and Mr. L. J. Thompson were in charge of affairs and made artificial stone by their method, which was of great interest to a large number of spectators.

Mr. T. M. Meek came to Minneapolis from Milwaukee and brought with him the Chicago improved concrete mixer. He spent his time in meeting friends and explaining the operation of the mixer that "has no insides."

A device which promises to be one of the greatest labor saving contrivances in the block and brick industry is the Mathews gravity carrier. All you have to do is to put your blocks upon it and away they go just as far as the carrier extends. It saves walking to and fro between the machine and curing room, or from there to the cars for loading. It was exhibited by the Mathews Gravity Carrier Co., of St. Paul, Minn.

Mr. D. J. Ames, of Minneapolis, was busy during the convention exhibiting a working model of the Ames rapid combination hand or power cement block or brick machine. Mr. Ames intends to have his machine on the market in the very near future.

The Menomonee Hydraulic Pressed Brick Co., of Minneapolis, displayed a full line of Ricketson's colors for brick, blocks and sidewalks made by the Ricketson Mineral Paint Co., of Milwaukee. Mr. Edward Bogk was in attendance part of the time, but Mr. Richard R. Colburn was in charge of the exhibit.

The Chicago Portland Cement Co., of Chicago, were well represented in the persons of Messrs. W. F. Main and J. W. Woodruff, who cordially greeted their many friends and made new acquaintances. No one left the exhibit of the Chicago AA without a contented feeling and a good cigar between his teeth.

One of the most interesting exhibits was that of the Concrete Block and Machine Co., of Minneapolis. Messrs. Box and Brown demonstrated the use of the air space machines.

Mr. E. R. James represented the Grand Rapids Plaster Co., and showed some very fine samples of their Sackett plaster board.

Mr. Martin T. Roche, of St. Paul, who is the Northwestern selling agent for "Alpena" Portland cement made by the Alpena Portland Cement Co., of Alpena, Mich., was in charge of the exhibit.

(Continued on page 64)



SNAP SHOT OF THE EXHIBIT FEATURE AT MINNEAPOLIS IN FULL BLAST.

Roofing.

The National Association of Master Composition Roofers of U. S. A.

Emil Machwirth, Buffalo, N. Y. President
P. LeGouillon, Pittsburg, Pa. First Vice-President
H. C. Smither, Indianapolis, Ind. Second Vice-President
W. K. Thomas, Chicago, Ill. Secretary and Treasurer

DIRECTORS.

E. S. Bertel, Philadelphia, Pa.
C. A. Menks, Louisville, Ky.
T. S. Harkness, Cincinnati, Ohio.

Official Organ, ROCK PRODUCTS.

Contemplate Another Association.

MINNEAPOLIS, MINN., January 18.—There is considerable talk of organizing an association of the roofers of the Northwest. At the meeting of the Northwestern Lumberman's Association, which adjourned here to-day, there was a large number of roofing manufacturers and dealers. The matter was broached and discussed by many of those in attendance, and the outcome was most favorable to the formation of such an organization. Some action will be taken in the near future.

Opportunity for American Roofers.

The British vice consul at Zanzibar reports that there is an opening in that country for a roofing material that will withstand the tropical rains and heat, which can be applied easily. Of course the price is a consideration that must be borne in mind. Corrugated iron is being extensively used by the European and Indian population, though tiles from Mangalore, southwest India, are finding favor, particularly on the better class of buildings, which are being erected by the government and some prominent residents.

It can be seen by this report that there is an opening in that country for American roofing materials which will comply with the above requirements. This roofing must be peculiarly adapted to tropical climates, and of necessity differs from materials which can be used advantageously in this country.

Making the Association a Strong One.

Although the meeting of the National Roofers' Association is some months off, reports indicate that the members have not lost any interest in the organization, but on the contrary, are doing all in their power to add new members and exert among the roofing fraternity in general a greater influence. There has been evidences of this good work lately which has demonstrated that the organization is doing good work among its members and those not yet within the fold, and they are endeavoring to largely increase the membership of the association.

While no one wishes to complain of the lack of interest among roofing people generally, it does not seem that this organization has grown as rapidly as it should have grown, particularly when one considers the large number of roofing organizations throughout the country and the importance of the industry which they represent. Practically every industry of any consequence has a live association with a large membership, and there is no reason, at least no plausible reason why the membership of the Roofers' Association should not be largely increased before the next annual meeting, which will be held August, 1906.

It is not the intention of this article to take to task any of the members of this association, as it is quite likely that all, or nearly all, have done their duty towards increasing the membership,

and giving assistance to one another. Still, the fact remains that the organization is to-day not nearly so large as it should be and the only way to increase its membership is by the present members doing all in their power to advance its objects and make known the good accomplished by such an association, and not leave such duties for a few earnest workers to accomplish.

There are several reasons why the roofers should join hands and work in harmony. In this age when so many large and important structures are being erected, competition for the roofing contracts have become so keen that the temptation, in nearly every instance, is so great to cut prices in order to obtain the desired job. Price cutting, as all of us are aware, is the bane of the life of this industry, and sooner or later must so demoralize it that the profits will be entirely lost sight of. Many firms are now forced to do business at a loss, or at so small a margin of profit as to make operations anything but encouraging.

There has been a considerable complaint among the roofers in months gone by of this evil, and there is only one practical way to counteract its growing popularity among roofing organizations and that is by a strong association of the roofing industry throughout the United States. It is folly to think that this can be remedied in any other way, for so long as a man simply has his own interests at heart, the chances are that he will not lose any sleep over his neighbor's misfortunes or care whether he ever gets an order or not.

It is all very well to talk charity, but in business the kind of charity generally found is of the cold blooded variety, which generally begins and ends at home. Now we are not aware that the roofers as a rule are any more blessed with this virtue than any other class of business men, and unless they have more than a supply of good will and a friendly feeling for their brother roofers, they will not cease endeavoring to secure a contract even at a loss, in order to keep their neighbors from securing it.

The need of an organization is most keenly felt where such cases arise, which are of frequent occurrence. Associations tend to make men forget themselves, at least to a certain degree, and realize that there are other creatures in the world which have as much right to exist as they do. They meet one another and have an opportunity to overcome any little prejudices which might have been formed simply from lack of personal acquaintance. They can see the advantages of allying their interests, realizing that better prices can be obtained and maintained by co-operation. Aside from this one primary reason there are hundreds of other minor reasons and advantages which only the interested members of an organization can fully appreciate.

It behooves the members of the Roofers' Association to begin immediate warfare towards strengthening this organization, so that at the next meeting all of the members will be represented and the applications for admittance will be the largest ever known. This is by no means impossible, and it is simply up to the members to get busy without further delay.

Mild Winter Favors Them.

The National Roofing and Supply Co., Louisville, Ky., announces, as usual, a continuance of good business especially in the roofing department. The continued mild weather is, of course, the cause for this activity, and many persons contemplating placing roofs in the spring time, have anticipated their needs and given orders for work at once. This condition of the weather has been the means of keeping this well known firm constantly engaged. In point of fact we are always assured of encouragement at the hands of this company. In the matter of concrete and granitoid construction the same conditions obtain, the weather favoring the work; this applies also to asphalt laying in various branches of this industry, in which connection this firm assure us of a more general use and adoption of asphalt laying.

To Enter Big Field.

JACKSONVILLE, ILL., December 23.—The T. D. Wilson Oil and Manufacturing Co write us: "This company is going to begin prospecting for oil, gas, coal, lead and zinc in the near future. We are large dealers in oils and manufacture paints and roofing. Our plant is located on the railroad and our business is steadily improving. The outlook for 1906 is very good."

Conditions in the West.

BUTTE, MONT., January 15.—The Western Asphalt and Gravel Roofing Co. write us: "Concerning the roofing trade in Butte, Mont., there is nothing of great interest that has happened during the past year, except the advent of some new prepared roofings, both of which are making a great headway. These are the P. & B. and Ruberoid roofings, the former having made its appearance on the market first and therefore has the best trade. There is a fair amount of gravel roofing, but as that branch is overstocked with incompetent and irresponsible contractors the architects and owners of many buildings turn to a prepared roof as they feel more certain of getting what they pay for, because, too often they do not recognize any difference in the grade of contractors doing that line of roofing. This being the case and Butte being a city of about 60,000 with its suburbs, and rapidly growing, there is a good opening here for another first class prepared roofing, and we would not be averse to handling it as agents, or possibly, buyers outright for this locality; correspondence in that line is therefore solicited. As for ourselves we have not installed any new machinery of any note, having a very fair outfit as it is, but are contemplating some additions the coming year, as Butte is in the midst of a great building era. There is a great shortage of residences now and numerous improvements of a varied character are being contemplated; among other things two new railroads of a continental type. We make house moving a strong branch line, and have a very fine outfit for such work easily distancing all competitors. But Butte has not become old enough yet to have many buildings to be moved as good buildings are put up to commence with. Another thing Butte can support is a manufactured stone establishment, but we understand that one is to be started this year; if not, we may take it up next year as there is none here and many buildings going up on which they could be used."

Establishing a Southern Branch.

NEW ORLEANS, LA., January 3.—The Philip Carey Manufacturing Co., which has large establishments in Boston, Philadelphia and Cincinnati, has just made arrangements to begin operations here, having leased a building at 222 Chartres Street. This large organization manufactures cement roofing, steam pipe and boiler covering. They have offices in many cities and is one of the largest concerns of its kind in the country. The local branch will be under the management of Mr. E. R. Rayburn, of Columbus, Ohio.

Good Year and Better Prospects.

CHICAGO, ILL., December 29.—J. M. Elliott, who is engaged in the felt, composition and gravel roofing business, writes us saying: "In winding up the old year, I find I have had a fairly good year of it, with a number of orders to be filled during the present winter. Some of them are in Indiana and others in Michigan. The outlook for next year is bright for the master roofers in Chicago and vicinity."

Big Asphalt Operation.

ALMA, MICH., December 16.—The Asphalt-Masticote plant, which is located in this city, has been sold to parties at Cincinnati, Ohio. Mr. A. W. Wright, who was formerly proprietor of this plant, will retain a certain interest in the new company. A new plant will be erected at a cost of \$50,000.00, to replace the one destroyed by fire several months ago. The name of the organization will be known as the Asphalt-Masticote Co., of Alma. A. Bishopric, of Cincinnati, Ohio, is president and Nathan R. Park, of Cincinnati, secretary. Arrangements are now being made to ship large amounts of California asphalt to the plant for operations.

The Star Roofing Co., New York, N. Y., has been organized to manufacture and lay roofing material. Capital stock is \$12,000.00. Edmund H. and Henry T. Mitchel, 37 Willow Street, Brooklyn, and Jno. T. Traphagen, of Suffern, New York, are the incorporators.

The American Rock Asphalt Co., of Boston, Mass., has been organized with a capital stock of \$10,000.00. The officers are: President, Michael Meehan, Boston; treasurer, J. E. Jones, Jamaica Plain, Mass.; clerk, Wm. G. Burns, Boston. The company will deal in asphalt.

Brick Sand-Lime, Cement.

To Utilize the Coast Sand.

A movement is on foot in England to utilize the coast sand in the making of bricks, and if it proves successful it should be an encouragement to try it here at home on the coast sand at Coney Island, Sandy Hook, and on the Jersey shore generally, to a further extent than has been heretofore attempted, says our New York correspondent.

Consul Williams, of Cardiff, reports that the great sand dunes extend for miles along the north coast of Bristol channel included in Glamorgan-shire, England. A company of business men with headquarters at Port Talbot have determined to put the sand to some use, and if their work proves profitable, a new industry will be built on the dunes. The plan is to manufacture bricks from sand. The experiment has proved a great success on the continent where the bricks are produced in several colors and take a glaze satisfactorily. The Port Talbot plant will have a minimum capacity



F. L. SIMPSON, OF CHICAGO, AND JOHN GRIEVE, OF CEYLON, THE TWO SCOTTIES OF THE DETROIT CONVENTION.

of 10,000 bricks per day. Some experts claim that these bricks made of sand and lime will be the building brick of the future in Wales and the United Kingdom.

Brick From Crushed Sandstone.

APPLETON, WIS., December 30.—The C. F. Smith Stone and Brick Co. write us: "We are considering the manufacturing of sand-lime brick from sandstone, crushed and ground into sand. From recent development work and tests we find that we have an unlimited bed of gray sandstone in our quarry that underlies the limestone. We have a large area of the limestone removed from the top of the sandstone. We note from a recent issue of your journal that you are giving this subject attention and beg leave to inquire if there are any plants in the country handling this proposition successfully, (viz.: making sand-lime brick from crushed sandstone)."

Large Sandstone Brick Plant.

SCHENECTADY, N. Y., December 18.—Operations are now under way for the construction of a large plant for the Schenectady Sandstone Brick Co., which was organized here a short time ago. The size of the plant will be 188x72 feet, and the same will be completed within a few weeks time. Modern equipment will be installed and about 100 men given employment. The officers of the organization are as follows: J. Wise, president; N. I. Jameson, vice president; D. B. Lyons, secretary, and L. T. Lyon, treasurer.

New Sand-Lime Brick Concern.

GENESEE, PA., December 30.—One of the late organizations in this city is the Allegheny Sand-Lime Brick and Concrete Co., which has been organized with a capital stock of \$10,000.00. The officers are: President, Thos. F. A. O'Donnell; vice president, G. A. Corson; treasurer, Elmer J. Johnson; secretary, Victor M. Allen; manager, George W. Bond. A plant is now being erected which will be in operation about May 1. The location of the plant will be on a tract of land containing valuable sand and gravel, said to be the best in the country. The small cost of fuel and the cheap freight rates will enable the company to compete with any others in this industry.

To Enlarge Its Plant.

MEMPHIS, TENN., January 3.—The Memphis Granite Brick Co., which was organized here about two years ago, has decided to reorganize and increase its capital stock from \$20,000.00 to \$75,000.00. This has been found necessary on account of the rapid growth of the company's business. A large number of improvements will be made and the output greatly increased. In addition to the manufacture of sand-lime brick, the company will also enter the concrete block business. These materials have been very scarce in this city and the outlook for the company is consequently very bright.

Will Utilize Beach Sand.

ROCKAWAY BEACH, L. I., January 2.—A number of parties are trying to interest some local citizens in the establishment of a sand-lime brick plant to be erected here. A site has been secured and beach sand will enter into the manufacture of the brick.

Only One on the Coast.

MONTEREY, CAL., December 21.—The large plant of the Monterey Brick and Stone Co., has just begun operation at Seaside, near this city. The company manufactures sand-lime brick by the Schwartz system. The plant has been equipped with the latest machinery which cost about \$40,000.00, and the capacity is 20,000 bricks per day. They have at the present time a sufficient number of orders to keep them busy for at least six months. This is the only sand-lime brick plant on the coast and prospects for the company's future are very flattering.

Will Soon Begin Operations.

SAVANNAH, GA., December 15.—Active operations are now being carried on in order to complete the plant of the Savannah Sand-Lime Brick Co. These consist of the construction of a spur track on the Central of Georgia railroad, and the installation of considerable equipment. Operations will begin early next month and the company will then begin to manufacture 40,000 brick per day. It is their intention to manufacture brick in three colors, cream-white, red and brown. The indications are that this company will have a prosperous future and orders have begun to give ample indications of this fact.

The Middletown Shale Brick Co., of Middletown, Pa., has been purchased by William Ferguson, of Cornwall, Pa. It is the intention of the new proprietor to enlarge the plant and install additional machinery which will greatly increase the output. The name of the company will not be changed.

The Lorraine Sand-Stone and Brick Co., of Lorraine, N. J., has been incorporated to manufacture and deal in sand-stone brick. The capital stock is \$125,000.00, and the incorporators are: Joseph D. Moon and Frank Lyons, of Lorraine, and Ethan A. Westerfield, of New York City.

Ezra Otto, of Woodstock, Ont., is promoting an organization in that city for the manufacture of cement brick. A large and modern plant is now being constructed and operations will begin in a short time. Mr. Otto is a resident of South East-hope.

S. J. Warren, of Brinson, Ga., will shortly begin the erection of a plant at Bainbridge, Ga., for the manufacture of cement brick. The cost of the plant is \$50,000.00. Mr. Warren has purchased property and operations will begin in the near future.

The Portland Stone-Brick Manufacturing Co., of Portland, Ore., has been organized by M. B. McPaul, Thomas K. Muir and F. Muir. Capital stock is \$175,000.00.

Clay.

Brick and Ceramic Meetings.

Those interested in the coming conventions of the National Brick Manufacturers' Association and the American Ceramic Society, should bear the dates and place in mind. The former will be held from February 5 to 17, and the latter during the first week of the brick association, at the Continental Hotel, Philadelphia, Pa. A big meeting is looked for and one attended with much success.

Iowa Association Hold Meeting.

The Iowa Brick and Tile Association meeting at Des Moines, on January 11, was very successful. Among other things the association favored the establishment of a school of ceramics at the State Agricultural College at Ames. The following officers were elected: C. J. Halman, of Sergeant Bluff, president; W. H. Brecht, of Des Moines, vice president; L. W. Denison, of Macon City, secretary; F. A. Stephenson, of Mason City, treasurer.



CLEVELAND APARTMENT HOUSE, BUILT WITH SPARTA FACE BRICK.

A Natural Fire Brick.

A peculiar industry is being carried on at Wickensburg, a little town in Arizona, by a Mr. Richard Roberts. Some time ago he discovered a large mountain deposit of a fire brick substance, which can be cut into blocks of any desired size and used in the construction of houses and furnaces. The material is absolutely fireproof, and can be sawed or chopped.

Tests have been made which show it to possess qualities superior to any manufactured firebrick. Mr. Roberts is at present quarrying the material in a crude way, but is arranging to make a large number of improvements. He has all the orders he can take care of at the present time. Another party, a Mr. Kinsman, is endeavoring to secure some suitable machinery for cutting the blocks, and it is the intention of these gentlemen to push the sale of their commodity.

May Install New Equipment.

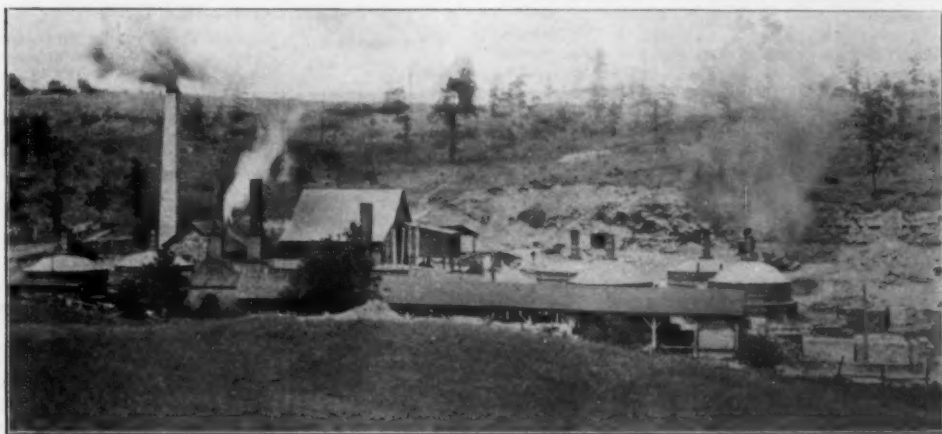
MUSKOGEE, IND. TER., January 20.—The Muskogee Vitrified Brick Co. has just resumed operations, after a temporary shutdown. The company is contemplating a number of improvements, among which is the installation of four more down draft kiln flues, in order to make a harder paving brick. The outlook is good for the present year's demand.

The Brinton Mills Development Co., of Philadelphia, Pa., has been incorporated to quarry kaolin, clay, paving material, etc. The capital stock, \$50,000.00.

In the Ohio Clay Field.

The Federal Clay Product Co., of Mineral City, Ohio is a close corporation combining under one management four splendidly equipped factories located in the east central portion of the State. The principal offices are located in Mineral City and under the personal management of Mr. George J. Markley president. Mr. J. Ira Davy is the secretary. They make a full line of fire brick, the famous "Sparta" face brick, shale brick and pavers. They have a full line of smoke stack linings, cupola linings, coke oven, brick and tile, lime kiln brick, blast furnace brick, and every kind of arch and kiln floor brick that may be required besides a full line of tiles for every purpose. A description of the four factories in detail follows:

Factory No. 1 was built at Mineral City, Ohio,



PLANT OF THE FEDERAL CLAY PRODUCTS CO., AT MINERAL CITY, OHIO.

14 years ago. It is an exclusive fire brick plant, making all the different grades. This factory has been in constant operation ever since it started, never idle for want of orders, which proves conclusively the reliability of the goods. At this factory are made any shape of fire brick required for any purpose. It has an up-to-date equipment, large capacity with an electric plant in connection. The company owns 118 acres of coal and clay lands, sufficient to run the plant for many years to come, having no freights to pay on either coal or clay. All material and fuel is dumped direct from their own mines to the factory.

Factory No. 2 is located near Sandyville Station, four miles north of Mineral City. The company owns 163 acres of coal and clay land, and have a capacity of 5,000,000 face brick per annum. This factory is where "Sparta" front brick are made in 18 different shades, beautiful and permanent in color—light shades that keep clean and never fade—fine quality of glazed brick for interior and exterior work are also turned out at this factory.

Factory No. 3, located at Canton, Ohio, consists of six kilns, a large factory building, fire proof dryer using waste heat from kilns 47 acres of shale and clay land. Shale brick are made at this plant. This factory made the first paving brick ever made at Canton. The shale found here is the finest in the world and fixes the quality of the goods. The works have a capacity of 500,000 brick per month.

Factory No. 4, located at Bolivar, Ohio, is a new, modern, up-to-date plant, and was only operated two or three weeks when a fire occurred burning a portion of the factory. It is being repaired and paving brick will be the exclusive product. Capacity of this factory is 50,000 to 75,000 brick per day. The company owns at this place 40 acres of clay and shale land of fine quality for making both paving and face brick.

All of this enormous capacity will be disposed of within the present year, and it is more than likely that additions will have to be made to more than one of the factories in order to keep up with the constantly growing business which the quality of the product makes necessary.

Mr. Markley is a stickler for quality and in the management of the business whether it be face brick or fire brick, pavers or linings, there is not a piece passed for shipment that is not carefully inspected as to its quality. A customer once secured is a constant user and this is the motto that is ever held in front of the onward marching van of progress.

Large Fire Clay Region.

One of the most notable deposits of fire clay in the country is to be found in and about the town of Kenova, W. Va. This place derives its name from three States, viz: Kentucky, Ohio and Virginia, on account of its close proximity to the above named States. This clay has been utilized by several large plants, among which are the O'Kelley Fire Brick Co., the Petersburg Fire Brick and Tile Co., and the Ashland Fire Brick Co., all of which are located near Ashland, Ky. This region has long been noted for its superior fire clay, the most valuable deposits are those associated with the ferriferous limestone and overlying the carboniferous limestone, which are in the vicinity of Ashland.

Near the town of Willard, W. Va., the thickness varies from five to six feet, the lower two feet be-

Operate Several Plants.

ASHLAND, Ky., January 26.—The Ashland Fire Brick Co. write us: "We own and operate five plants, two of them at Ironton, Ohio, two of them at Ashland, Ky., and one at Hayward, Ky. These plants are adapted naturally to the manufacture of the different kinds of brick. At our Ironton plants we manufacture coke oven brick and brick for general purposes and also a vitrified paving brick which gives very excellent results. Our Ashland plants manufacture all kinds of high grade refractories, and devote our time more especially to top linings for blast furnaces, to steel mill and rolling mill brick. Owing to the great plasticity of the clay, which we mine from the hills near Ashland, we find these brick give better results for the middle and top linings of blast furnaces than any brick in this district. We also make a great many locomotive tiles at these plants. At our Carter County plant, where we have an immense acreage of the Carter County flint clay, we make our highest grade bricks. These brick are used for the Hearth-Bosh of furnaces for malleable heating furnaces and for all purposes where the highest grade refractories are required. It is here that owing to the fact that the clay is exceedingly high and alumina, we take our "Ironton Crown Liners" for rotary cement kilns upon which we have a splendid reputation, shipping them all over the world where cement is made and where they are once used, owing to the toughness of their structure, it generally means returned business."

Fire Clay in Utah.

SALT LAKE CITY, UTAH, January 20.—It is understood that a large plant will be established here for the manufacture of fire brick, sewer pipe, etc. A large deposit of fire clay and kaolin has been found at Fairfield, Utah, which is being examined to determine its exact value. In the event that it proves to be useful, plans for erecting the plant will be undertaken.

Erecting Big Paving Brick Plant.

DES MOINES, IOWA, January 3.—One of the largest paving brick plants in the West is being erected here by the Barber Asphalt Paving Co. It will be completed by May 1, and will have a daily capacity of 150,000 standard paving brick. The Barber company purchased the old plant of the Capital City Brick and Pipe Co., at South Fourteenth Street and Hillside Avenue. The cost of the new plant will be \$125,000.00.

The Western Art Tile Co.'s plant at Tropic, Cal., is to be greatly enlarged. A new company has been formed in order to arrange for the changes, which is known as the California Tile and Terra Cotta Co. Over \$300,000.00 will be expended on improvements.



CLAY MINE AT SANDYVILLE STATION, OHIO, FEDERAL CLAY PRODUCTS CO.

Plaster.

The Perfection of Metal Lath.

The metal lath feature in the up-to-date office building and hotel construction has come to be the accepted proper thing. When used in connection with the hard wall plasters that have so effectively taken the place of the old fashioned sand, hair and lime combination, there is no necessity for the cumbersome wooden lath. There was a time when hickory and oak could be secured at a reasonable figure and a rived or split lath sold cheap enough to be used for this purpose. In later times they have sawed the lath out of scrap lumber and the wooden lath offered upon the market to-day is indeed a scrap product, the very shoddiness of which has made it imperative to introduce something that will maintain a comparatively uniform price and will perform its function in a reliable manner.

Out of every bundle of wooden lath that are sold to-day there is a large percentage of waste, and as the timber becomes scarcer and lumber grows higher in price, it is no more than natural to expect that the percentage of waste will increase rather than diminish, and the actual price of wooden lath used in any given work will increase in exactly the same ratio. Plasterers already begin to feel that a metal lath proposition is just as cheap in the long run for the man who desires to build substantially.

This is not the only advantage offered by the new material. Plastering spread upon metal lath approaches very nearly to a fire-proofing proposition, and even a studding wall carrying a metal lath and plaster surface on both sides is almost as fire proof as a solid concrete construction, for when properly put up there is no way for the fire to get to the small amount of wood contained in the frame.

When it comes to the proposition of lathing for a large ceiling, it is impossible to compare the best obtainable wooden lath of the present day to the metal lath or expanded metal which can be so rapidly and securely fastened in its place and carry the weight of the mortar with such absolute security by reason of the scientific arrangement for keying it in the position.

The builders' supply men throughout the country have begun to organize this and the stocks of metal lath are being carried by more dealers and in much larger quantities than they have at any previous time. It is one of the modern improvements that is now well recognized.

Have Reorganized Company.

The Knox Wood Fiber Plaster Mills, of Knoxville, Tenn., have been succeeded by the Knox Fiber Plaster Mills. The capital stock has been increased from \$10,000.00 to \$25,000.00 and the following officers have been elected: Henry D. Blanc, president; James T. Carter, secretary and treasurer, and Hugh A. McCulla, manager. The new company with increased capital and facilities, are now in a position to promptly take care of all orders placed with them. They will continue the manufacture of wood fiber plaster under the well known brand of the wonderful "Knox."

Will Rebuild Plaster Mill.

The three-story two-kettle calcining mill, and mixing plant, which the Pittsburg Plate Glass Co. had about completed at Venice, Ill. (a suburb of St. Louis), for the handling of the staff and plaster from the late World's Fair grounds, was totally destroyed by fire on December 30. The fire was apparently of incendiary origin. The place was insured for less than one-fourth its cost. The mill is being rebuilt as nearly fire-proof as possible, and will soon be producing the famous "Colossal" wood fibre plaster, under the direction of J. W. Voglesong, originator of this commodity, and manager of the Pittsburg Co.'s wall plaster department.

Plaster Concern Resumes Operations.

The new plant of the Wheeling Wall Plaster Co., at Wheeling, W. Va., has just been completed. This replaces the structure which was destroyed by fire last summer. The new buildings consist of a plaster mill, drying house and engine room.

Operations were resumed a few days ago and the plant will be run on double time for some time in order to take care of a large amount of business which has accumulated. The capacity of the company's output will be doubled, the rapidly increasing demand for its wall plaster having made this necessary.

It is the intention of the company to only manufacture one brand of hard wall plaster in future, which will be the Wheeling Improved plaster. "Wheeling," the popular brand, has a well deserved reputation among architects, contractors and builders, but the newer make will shortly surpass it, which has already been approved by the government architects at Washington. One of the recent contracts received by this company is that of the new Wheeling federal building, and other large structures in the vicinity.

This company was organized in 1900 with a small capital stock, from which it has grown to its present large proportions, now having a capital of \$150,000.00. Despite the fact that they have had two losses by fire, their business has steadily increased, which is ample evidence of the quality of their output. In addition to hard wall plaster the



R. W. MARSHALL, PRESIDENT WHEELING WALL PLASTER CO.

company will also manufacture asbestos and fire proofing mortar. The latter is applied on expanded metal lath, which has been highly approved by the best architects and insurance inspectors. Builders' supplies will likewise be handled by the company, which is a big feature of their business.

The officers of the company are: R. W. Marshall, president and general manager; James R. Brkbeck, secretary, and H. W. Olmsted, superintendent. In 1902 the company purchased the plant of the Dennison Wall Plaster Co., Uhrichsville, Ohio, which was removed to Wheeling. They are also interested in the gypsum mines and calcining mills at Port Clinton, Ohio, and operate a sand bank. Temporary offices have been erected near the plant, which will later be removed to the Schmulbach building when the same is completed.

One of the Great Industries.

Among the many resources of the territory of Oklahoma is the immense gypsum deposits in several sections of that locality. According to some late reports of several geologists, it is estimated that in Green county something like 53,000,000 tons of gypsum deposits are within the boundaries of this single county. Other sections of the territory are also rich in this material, the value of which is inestimable, and means that the supply of gypsum for the plaster manufacturers in this section alone is sufficient to supply them for many years.

Valuable and extensive gypsum deposits are also found in a number of the sections throughout the United States and the increased demand for various kinds of wall plaster and other operations

where gypsum enters largely as one of the prime ingredients, have caused a great activity in this industry during the past few years. Indications now point to a year of exceptional activity for the plaster manufacturers and the great building fever, which has become an epidemic throughout the entire country, means that the use of plaster in its several forms will be in greater demand than has ever been known before.

Primarily among the plasters that have obtained popularity during the past year or more is wood fiber plaster, and interest and competition among the various manufacturers has done much towards not only advertising it in an extensive way, but also of improving the character of its quality, so that there is no better article on the market today than what is known as hard wall, or wood fiber plaster.

Indications for 1906 Good.

The Toledo Pulp Plaster Co., Toledo, Ohio, report a good year for 1905 and the indications are that their business will be doubled in 1906. They manufacture the genuine Elastic Pulp Plaster and are manufacturers agents for Portland cement and lime. Their motto is to manufacture and sell nothing but the best. The high standard and excellent quality of their pulp plaster has won for them a line of customers that refuse to sell any other make.

Their Output Proving Popular.

NEW HAVEN, IND., December 12.—The Elastic Plaster Co. write us: "The president and members of this company are well pleased with the success of the work of their secretary and manager, Mr. Con. Ragan, in his efforts to get their Nemaline wood fiber plaster introduced in Ft. Wayne, Ind. Ft. Wayne is the greatest old-fashioned plaster city in Indiana, and is a very hard city to introduce patent plaster in, but with the untiring efforts of Mr. Ragan, he has landed the contract to furnish Nemaline fiber plaster on the new Luthern Hospital, which is now being erected in the city and also on the new Hays Hotel. The letting of these two contracts to the Elastic Plaster Co. has caused a commotion among the plasterers and people of Ft. Wayne, who, no doubt, will soon be in line to use patent plaster as this company is now daily receiving inquiries from Ft. Wayne for particulars and prices on Nemaline. The Plaster Co. has had a very prosperous year, as will be attested to by the railroad agents here whose accounts show that the Plaster Co. has been their best customer at New Haven. The formula used in making Nemaline is first class, and as quality talks in all lines of business, Nemaline will surely win, especially under the management of Mr. Ragan. Plasterers, contractors, or any one interested, and desirous of learning the merits of Nemaline will receive such information as they desire by writing the company, who will cheerfully answer all correspondence."

Right Church out Wrong Pew.

The Rockford Wall Plaster Co., of Rockford, Ill., send us the following note which we gladly publish: "The nice write-up you intended to give us on page 42, in your December 22 issue, we regret was credited to a firm which does not exist at Rockford, Iowa. We shall appreciate your correction of the same."

Reorganize and Make Improvements.

GRANDVILLE, MICH., January 20.—The plant of the Michigan Plaster Co., of this city, is being remodeled and some new equipment installed. A 100 h. p. generator will be installed which, with other improvements, will cost several thousand dollars. The plaster industry is growing and the Michigan company are getting their share of the business. The indications now point to a very busy year with them. This company has just been reorganized and incorporated with a capital stock of \$50,000.00, of which amount \$25,000.00 has been subscribed and \$10,000.00 paid in.

May Develop Gypsum Mines.

FLORENCE, COL., January 10.—Some local parties have just made application to the state to lease some gypsum quarries in the valley near here. It is said that in the event they are successful a large plant will be established to develop the same. John Coudry, superintendent of the mineral department of the State land board, recently visited here to make an investigation of the deposits.

For the Retailer.

The National Builders' Supply Association.

Meets Semi-Annually.

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Cleveland, Ohio.	
H. C. GODFREY.....	Vice President.
Bridgeport, Ct.	
CHAS. WARNER.....	Vice President.
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HENRY S. WEST.....	Assistant Secretary.
Toledo, Ohio.	

Official Organ, ROCK PRODUCTS.

On to Phil'ey.

The Entertainment Committee of the National Builders' Supply Association at Philadelphia have their plans pretty well laid for a good time socially, for those who attend this annual meeting. Chas. Cox, of Cox & Son, secretary, in speaking of the matter the other day said: "We have arranged for a smoker one evening with entertainment by an amateur artist, and you know Philadelphia has many of them. The second evening, Wednesday, will be taken care of by a special program for the entertainment of the delegates. The Ladies' Committee will give their time to seeing that the ladies enjoy the sights of Philadelphia, and the builders' supply man who does not become a member of the National Association after attending this meeting, the visit with the manufacturers of cement, lime, plaster and other lines carried as well as his competitor, will make a big mistake in 1906."

The benefit derived from this meeting each year has devolved many new ideas, has not only increased the volume of business with the dealer but his profits as well. Secretary Kline and President Kling, the other members of the committee have made special arrangements to see that the business program will interest all present, and the big Bellevue-Stratford (a picture of which is herewith given) will be a beehive of the builders' supply men on the 6, 7 and 8, of February. Make your men on February 6, 7 and 8. Make your plans to be with us, this is the last call. If you

are a stranger in Philadelphia and come on the Pennsylvania railroad, the Bellevue-Stratford is practically two blocks from the depot on Broad Street. If on the B. and O. it is only a few minutes ride on the street car, or from the Reading terminal it is only about five blocks away. It is the best location in the United States, and no one



THE BELLEVUE-STRATFORD HOTEL, PHILADELPHIA, PA.

will gainsay that Philadelphia, with all its talk about its slowness, is the greatest city in the United States.

Mantel and Tile Convention.

The second annual convention of the Interstate Mantel and Tile Dealers' Association will be held at Baltimore, Md., on Tuesday, Wednesday and Thursday, February 13, 14, and 15, at the Belvedere Hotel. It is likely that this will be a much larger meeting than the previous one and it is estimated that nearly 500 will be in attendance. These men will represent the largest majority of mantel and tile manufacturers in the country. The first and second days will be devoted to the business sessions. A special program has been prepared for the evening of the second day, which promises to surpass anything of the kind ever attempted. On the evening of the third day a banquet will be given the delegates.

The following committees have been appointed to look after the interests of those who attend:

Reception—Messrs. S. Homer Calkins, H. M. Gault and J. A. Marrian.

Finance—Messrs. Chas. J. A. Steiner, Chas. Wellner and Joseph B. Dunn.

Banquet—Messrs. Chas. L. Hilgartner, F. A. Broadbent and J. A. Marrian.

Oyster Roast—Messrs. Chas. A. Steiner, Hugh Lisson and David Fishbach.

A Very Old Establishment.

One of the patriarchs of the builders' supply industry is Mr. M. Baltes, of Fort Wayne, Ind. He came to this country when only eighteen years of age with three of his schoolmates aboard the same ship. They were all born at Oberkirchen, Tier, Rhinish Prussia. They landed in New York and Mr. Baltes says that he was carrying a big heavy cane and had exactly the large sum of twelve cents in his pocket. He very soon secured employment and learned the tomb-stone business at a salary of three dollars per month. Later on he came to Indiana, arriving at Huntington, long before the Civil War. On this occasion he had as much as a shilling on arrival which he invested in a straw hat, and then set about to find employment. The first dollar that was paid him for services he sent to his mother in Germany.

At the time of the building of the Pennsylvania railroad, he began taking several minor contracts and rapidly advanced until he became one of the principal contractors doing business upon a very large scale. He had been very active in the lime industry around Huntington and Wabash, Ind., and recognizing the growing importance of the city of Fort Wayne, in the year 1861 he moved here al-

though at the time he did not know a soul, secured a location on the banks of the canal, where the extensive building supply concern of E. M. Baltes & Co., is located at the present time.

At the time he moved to Fort Wayne, he had three canal boats which he employed in bringing stone from Wabash and lime from Huntington. These canal boats afforded very profitable transportation facilities and Mr. Baltes soon became the principal general contractor of the thriving city of his adoption.

Mr. Baltes is a very entertaining talker and can tell many anecdotes with regard to the builders' supply business and the quarrying industry in the old times, for in the active days of his business career he has been connected with a large number of quarrying operations in and around Huntington and Wabash. He has manufactured lime upon a very extensive scale and is the father of many of the solid concerns in these lines which are now in the hands of the men who as boys he brought up in the way they should go. The success that has attended his efforts has given him a very comfortable fortune, besides the assistance which he has extended to others who have been associated with his business endeavors. While Mr. Baltes has retired, or says he has, it is impossible for him to keep away from work, so he comes down to the office every day and looks on to see how Edward and Theodore are carrying on the business at the old stand which has been the scene of so many of his activities for half a century.

When he came to Fort Wayne in 1861, it was a mere village and the very work that has kept him busy are the buildings that have transformed that village into the proud city which is a commercial center for a very large and prosperous district.

Very many of the most important business blocks, as well as every other kind of building in the city of Fort Wayne, have been built by him. Mr. Baltes is an uncle of Peter Martin, the president of the National Lime Manufacturers' Association, and he educated Mr. Martin in the business.

He is at present connected with a number of the principal lime manufacturing concerns in northeastern Indiana, and although he is now a silent partner, he gives his daily personal attention to the affairs of the Baltes Stone Co., at Montpelier, Ind., as well as the great builders' supply concern at Fort Wayne.

About ten years ago Mr. M. Baltes associated with himself his son E. M. Baltes and Mr. Theo. C. Schwieler under the style of E. M. Baltes & Co., dealers in builders' supplies and the same gentlemen constitute the firm of the Baltes Stone Co., at Montpelier. They have just completed a handsome warehouse located on the spot where the business has been conducted continuously for nearly fifty years. This building is 36x100 ft. two stories and a basement of brick and very solid interior construction, while the basement is built of the fine rubble stone from their own quarry (a description of the Baltes quarry appeared in Rock Products, December 22, 1905.)

E. M. Baltes & Co., handle a very full line of builders' supplies including the Western Lime Co.'s quick lime and hydrated lime; Saylor Portland cement, roofing materials, metal lath, sewer pipe, fire brick, tiling, and plaster material of every description.

Ed. M. Baltes, the present head of the firm was born in Fort Wayne in 1873, and he has been associated with his father in the building supply business up till about four years ago when he went into the plumbers' supplies. Mr. Theo. C. Schwieler took his place in the builders' supply line. The Plumbers' supply business has been closed out and Mr. Ed. M. Baltes will take personal command of the quarrying interests of the firm, and will devote his energies to producing rubble bridge and dimension stone, crushed rock for concrete purposes and fine ground sand which is as good as the best torpedo sand.

Mr. Theo. C. Schwieler is a Fort Wayne boy and has grown up with the business as a builders' supply man. As Mr. M. Baltes expresses it, "Theodore's a mighty handy man with his head." This is short, but it says a great deal.

The firm of E. M. Baltes & Co. is very progressive and from the beginning of the association of builders' supply dealers, they have been represented at nearly every convention. They are the first to see the advantages of any new material introduced in the market and get the cream of the business that is attracted by such up-to-date methods in the conduct of their business.

FORM NEW ORGANIZATION.

The Illinois Masons' Supply Association a Reality.

SPRINGFIELD, ILL., January 24.—The first annual meeting of the Illinois Masons' Supply Association was held here to-day and all were imbued with the necessity for such an organization, and enthusiastic over the prospects of a good strong organization. This body will affiliate with the National Builders' Supply Association, and the Illinois Retail Lumber Dealers' Association.

Owing to the absence of President Harwood, Peter Vredenburg, of Springfield, vice president, presided. Secretary Park did the honors of chief rustler, had a pocketful of applications for membership.

A letter was read from President Harwood stating that he appreciated the honor conferred in his election to the presidency for the ensuing year and assured the members that he would do all that was possible to further the work of the association, because of the necessity of a closer walk by the mason material dealers.

The roll call gave the following list: C. A. Glore, Centralia, Ill.; G. J. Parke, V. H. Parke & Son Co., Decatur, Ill.; J. A. Bryden, Alexander Lumber Co., S. R. Cornish Lumber Co., Aurora, Ill.; G. W. Hotchkiss, Secretary Illinois Retail Lumber Dealers' Association; H. G. Irvine, Peter Vredenburg, Vredenburg & Sons, W. E. Terry, Jr., D. B. Kimball, W. E. Kroy Lumber Co., Springfield, Ill.; N. E. Holden, Danville, Ill.; J. H. Shuck, J. H. Shuck & Bro., Springfield, Ill.; C. P. Probst, Paris, Ill.; Andrew Russell, Jacksonville, Ill.; W. E. Terry, Terry & Lewis, Galesburg, Ill.; F. O. Hill, F. S. Hall, Danville Lime and Cement Co., Danville, Ill.; A. H. Brumling, H. G. Brumling Lumber Co., Havana, Ill.; L. E. Rice, L. L. Watson, U. S. Gypsum Co., Chicago, Ill.; James Gaynor, James Gaynor & Son, Danville, Illinois.

Vice President Vredenburg extended a hearty welcome in behalf of the dealers in builders' supplies and the city of Springfield, and congratulated the gentlemen on the occasion of the first meeting and suggested that Secretary Park, being familiar with the parent organization of the National Builders' Supply Association and the efforts to follow this movement, would state its object.

Mr. Park said: "We had a very nice meeting at Decatur and this meeting was called because the dealers of Central Illinois asked for it. In the creation of membership in this organization, owing to our co-operation in the National Association, we are limited to towns of 15,000 and over, but it seems to me the builders' supply dealers of the State should become a part of this organization and there are great possibilities ahead for us. Other vice presidents of the national body, of which I am also one, in that capacity in the State of Illinois, created such an organization as we are endeavoring to promote to-day in New Jersey, and found it was very beneficial, and while there were only 35 or 40 people invited to participate in our meeting, we had 14 at the meeting in December and hope to have the interest of every man in our lines and he is invited to join with us that this organization may be a power in our State.

"One of the objects of this association is to gain the protection desired and needed, and we have with us to-day a man who has done much for us in the past, the secretary of the Illinois Retail Dealers' Association, Mr. G. W. Hotchkiss, but, owing to his multitudinous duties, he was unable to give us the attention that we needed, but we have his assurances of co-operation with this body and that the benefits to be derived will be great, and his advice as to plans of forming the association have been heeded. All legitimate dealers in builders' supplies have suffered because all manufacturers have not always conducted their business through the proper channels, and the future certainly is not bright before us, as we are in a disorganized condition. All manufacturers are having associations now-a-days and the retailer of builders' supplies will certainly be benefited by this organization and I hope that we will, as individuals and as a whole, influence all to come and be with us.

"As an instance of the need of this organization, where the manufacturer sells to the contractor, the dealer is a loser. While I am sure that most manufacturers desire to conduct their business through the channel of the dealer, if possible, it seems to me by co-operation with the manufac-

turer that it would be very much easier to carry on this work, and we will all be benefited thereby."

Mr. Hotchkiss, who was present, was then asked to make a few remarks. His first suggestion was that he did not like to see the gentlemen sit so far back from the president's desk. He said the closer we get together the sooner we will inaugurate that sociability that always insures a closer walk of the membership of an organization. He said further, "I am glad to see this organization formed. There is great good to be gained by it. The affiliation of dealers in a friendly way without any antagonism toward any one always means benefit to the individual as well as the collective lines of trade interested. A great increase in the uses of the products of the rock in building lines makes it necessary to promote business affiliations, and this was illustrated to me most thoroughly in looking in on the cement block manufacturers meeting at Minneapolis a few days ago. The old slogan of the Retailers' Association, 'We sell to dealers only,' would be a good banner for this organization, and by friendly suggestion will gain the co-operation of the manufacturer, and his desire to affiliate with you. It seems to me that it is a matter of business with the manufacturer as well as the dealer. The dealer is on the ground and he is able to watch credits and is able to suggest new lines of trade in which masons' supplies are used, and by a friendly co-operation with the manufacturer there is no doubt about his being able to handle material through the dealer and result in the mutual benefit of the manufacturer, dealer and consumer."

Mr. Hotchkiss spoke of the cement block industry as a factor in the business in the growth of new uses of cement and urged the dealer to familiarize himself as to how best to mix and use cement so that he can suggest to the consumer in an intelligent way the uses of the products which he is handling. A man by cheapening the mix of concrete, either due to ignorance or carelessness, may be instrumental in hurting the product in a community and, therefore, he believed the mortar supply association would be of great benefit to all concerned.

E. H. Defebaugh, editor of Rock Products, was asked to make some remarks. He encouraged the dealers in Illinois to individually make a special effort to make this association a success, for without the social features dealers were not getting together, do not learn to know each other well, and until they are well acquainted, the cloven hoof and horn can always be seen on the other fellow. The dealers in meeting each other and co-operating with the manufacturer can direct to proper channels the builders' supply material business in Illinois. The exchange of ideas alone as to the proper handling of these materials, the methods as to how to increase the volume of their business, the aid in the correction of the lien laws, the friendly co-operation between dealers in adjacent towns, and in many other ways can improve the method of doing business. "My experience," he said, "with the manufacturer, in talking over the question of selling to dealers only, has been that I am satisfied when the manufacturer and dealer get together on equitable lines there will be no difficulty in directing trade in the proper channels. On the matter of credits alone the manufacturer could be the gainer, but reciprocity must necessarily be worked out to insure the best results for all interested. Perhaps the dealer has been to blame at times when the manufacturer has sold to the consumer, and there is one sure thing—unless manufacturer and dealer get together and can understand each other chaos will continue to prevail. I believe you can better get the co-operation of the manufacturer by studying the uses his material can be put to and to work out a campaign among your customers and your neighbors and your friends and see that masons' materials are used in every place possible, and if you are in touch with the live men in your community and can guarantee certain business to the manufacturer, and every dealer will do the same thing, there will be no necessity for the manufacturer to look around for some place to dump his stock because his warehouses are full, and if he has made contracts and orders are not being placed to take them up he will always know where he can sell a carload or two extra to the dealer who has created the demand in his community.

"I am very happy to be with you here to-day and congratulate you on the auspicious beginning for your organization. As far as Rock Products is concerned you can count on our most hearty co-operation because we believe in the legitimate channel for the sale of manufactured products in

his line and we have preached this from the hill top, but we always believe also that there are two sides to every question and the threadbare subject of reciprocity must be carried out by both parties to insure satisfactory results to all.

"In making this talk I feel like a child first reciting his a b c's to the teacher, for the gentleman preceding me, Mr. Hotchkiss, was my first teacher on association matters and he has covered the subject in his usual thorough manner."

Mr. L. E. Fuller, of the American Lumberman, made a few well chosen remarks, congratulating the gentlemen on their organization and assured them that the American Lumberman would co-operate to assist their cause.

Mr. L. E. Rice, of the United States Gypsum Co., was asked to address the meeting and he assured the members that the United States Gypsum Co. had always been friendly to the dealer and were more so to-day than ever, and he was satisfied that the policy of his company was to co-operate in every way possible to conduct their business through legitimate channels.

The roll call of the membership was then had in order to determine who were in the association and they were read as follows:

Peter Vredenburg Lumber Co., Springfield; J. W. Evans' Sons Co., Bloomington; Darlington Lumber Co., W. S. Harwood & Bro.; N. E. Holden, Danville; V. H. Park & Son Co., Decatur; Paddock Lumber Co., Pana; Probst Lumber Co., Paris; Potter Lumber Co., Arcola; Peoria Fuel Co., Peoria; W. J. Huff Lumber Co., Urbana; E. Kent Lumber Co., Clinton; Terry & Lewis, Galesburg; C. A. Glore, Centralia; B. P. Andrews & Co., Rushville; E. F. Davis, Oregon; H. D. Bruning Lumber Co., Havana; Ross Lumber Co., Morris; Greenville Lumber Co., Greenville; F. L. Hill, Danville; E. C. Lamm, Danville; Danville Lime and Cement Co., Danville; M. Ganor & Sons, Danville; H. & E. F. Hunter, Chillicothe; W. E. Terry Lumber Co., Springfield; Sanford & Zartman Lumber Co., Freeport; Mark Anthony, Streator; Holcomb Bros., Sycamore; William Hoskins & Co., Galena; C. Mueller Lumber Co., Moline; Greenville Lumber Co., Greenville.

A ballot was had and the following gentlemen were elected. The officers elected at the Decatur meeting were:

President, Willis S. Harwood, Bloomington; vice president, Peter Vredenburg, Jr., Springfield; secretary, G. J. Parke, Decatur; treasurer, C. O. Lewis, Galesburg.

It was decided to appoint an executive committee of twelve and that five of the members be named at this time, leaving seven to be chosen to-day. Those elected were: C. A. Glore, Centralia; F. L. Hill, Danville; Peter Vredenburg, Jr., Springfield; O. H. Paddock, Pana; C. F. Probst, Paris.

The committee appointed to nominate selections for the required delegates were: C. F. Probst, F. L. Hill and W. E. Terry. They selected C. E. Nichols, Peoria Fuel Co., Peoria; W. M. Sanford, Sanford & Zartman Lumber Co., Freeport; Mark Anthony, Streator; S. A. Holcomb, Holcomb Bros., Sycamore; T. J. Birmingham, William Hoskins & Co., Galena; Chris Mueller, Mueller Lumber Co., Moline; C. E. Davidson, Greenville Lumber Co., Greenville.

The minutes of the Decatur meeting were read and approved, thus making the constitution and by-laws and selection of officers a reality. An interchange of views brought out the suggestion from N. E. Holden that it was time they should all get busy and individually get out and get members for the association and make a success of it because the results depend on a large membership. He said to see, as an illustration, what Danville had done, and if every one would do likewise and make himself a committee of one we could soon have a very large membership. The secretary took Mr. Holden at his word and gave him a number of blank applications.

The subject then came up as to the block manufacturer and it was the opinion that he was a natural customer of the dealer should be treated as such by the manufacturer, and by co-operation the dealer could not only assist the block man, but the manufacturer, in diverting the shipments of cement or any other building material, through the dealer to the block man. Mr. Hotchkiss remarked that the block man certainly in no sense of the word was a regular dealer and by getting up a list of regular dealers in lime, cement and other products the Association would have something to present to the manufacturer for his intelligent co-operation. Mr. Hotchkiss said there were something like 1,500 or 1,600 lumber dealers in the State and probably 85 per cent. of them, or 1,300, were handling lime, cement, plaster and

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other masons' supplies. Mr. Hotchkiss promised to co-operate in securing this list.
Adjourned.

The Declaration of Principles.

In the declaration of the purposes of the articles of the Association it was stated that it was desired to promote closer acquaintance among building material dealers and manufacturers; to protect ourselves against unfortunate misunderstandings so ruinous to the prosperity of the trade; to get in unison on all matters of mutual benefit in any manner not conflicting with the laws of the land; to disseminate among building material dealers and manufacturers a better knowledge of all matters pertaining to the trade.

We recognize the right of every person, partnership or co-operation to establish and maintain a retail yard. We also recognize the disastrous consequences resulting to the legitimate dealer from direct competition with importers and manufacturers, and see the need for co-operation to get accurate information as to the nature and extent of such competition; and further recognizing the advantages of co-operation we have organized this Association on the following lines:

Its name is to be the Illinois Masons' Supply Association.

Membership: Any firm or person or corporation within the territory of the Association regularly engaged in the building material trade; carrying an assorted stock supplies for masons, cement workers, plasterers, sewer builders, pavers and other similar building material reasonably commensurate with the demands of his community shall be considered a building material dealer and eligible to membership in this Association when not engaged, however, in contracting or building also.

The Executive Committee shall decide finally who is eligible.

Application for membership shall be in writing accompanied by initiation fee of \$5.00. The annual dues shall be \$5.00. The initiation fee and annual dues shall entitle the party to membership and to all the rights and privileges of the Association, and when entering the contracting business he is not considered a dealer and no notice or resignation is necessary.

ART. 3. SEC. 7. Any member of this association having knowledge of a sale or quotation by a manufacturer, importer or his agent, to a consumer within the territory of such member, may notify the secretary of this association, in writing, giving as full information thereto as practicable, such as date or dates of shipment and arrival, car number and initial, original point of shipment and, name of consignor and consignee, the purpose for which the material was or is to be used, and such other particulars as may be obtainable.

HONORARY MEMBERSHIP.

ART. 4. SEC. 1. Manufacturers and importers of masons', plasters', pavers', sewer builders', or other similar building material, may become "honorary members" of this association.

All applications shall be in writing and shall be filed with the secretary of this association. The annual dues for each honorary member shall be \$5.00 per annum, payable in advance. Honorary members shall have the privilege of attending the meetings of this association, excepting when the association is in executive session.

The officers of the association shall be a president, vice president, secretary, and treasurer, and an executive committee of fourteen members. The duties of these officers are similar to those of any organization.

The annual meetings shall be held the second Thursday of January of each year. Special meetings may be called by the Executive Committee.

ART. 6. SEC. 4. Each member, when he joins this association and once each year thereafter (and oftener if the board of directors shall request it) is expected to furnish the secretary, when called upon to do so, a list of those manufacturers and wholesalers and their agents, from whom he makes purchases of lumber and other building material.

EXEMPTIONS.

SEC. 5. Nothing in the foregoing sections shall be construed so as to entitle members to make reports on account of sales or shipments of masons' supplies, etc., to railroad or transportation companies, where said material enters directly into their construction work.

Fifteen shall be a quorum to conduct the business of the Association and the articles may be amended at any regular meeting.

NOTES OF THE SPRINGFIELD MEETING.

The W. E. Terry Lumber Co., is the newest builders' supply concern in Springfield, Ill. It is an offshoot of Terry & Lewis, Galesburg, who operate three yards and handle lumber and all classes of building material. Terry, Jr., and Mr. Spaulding are managers at Springfield. "Boss" Terry, (W. E.) of Galesburg, drops in on them occasionally to see how the world does move. It seems like old times to drop in on Col. Terry, for we used to attend retailers' meetings together for many years.

Another pair of old friends at this gathering was Propst, of Paris, and Hill, of Danville.

Bruning Lumber Co., of Havana, use about twenty car loads of cement a year. They are making cement brick in addition to handling all kinds of building material. A. T. Bruning, of this concern, anticipates a very active business in their yards this year owing to the general prosperity in Illinois.

Decatur is getting to be quite a cement consuming town. G. J. Parke tells us a new church is being erected there at a cost of \$125,000.00 largely of cement.

A retailer of lumber is finding an increase from time to time in masons' materials in his volume of business annually. The man who formerly handled but one car a year of cement is now handling ten or twenty. As the years go by it is going to be quite a factor in the consumption of cement.

It is said in Alaska that concrete is one of the newest materials being substituted for lumber.

The lumberman, himself, is getting to be quite an apostle of concrete. The Foster Lumber Co. is putting up a distributing warehouse for sash and doors at Decatur, using 16 inch concrete piers exclusively for foundation.

The first honorary member of the Illinois Masons Supply Co., was Hunkins-Willis Lime and Cement Co., of St. Louis.

This question was propounded the other day: How many brick can you lay with five sacks of forty pounds each hydrated lime? An old time dealer says that in a barrel of lump lime from fifteen hundred to twenty-three hundred brick have been laid. There seems to be considerable question as to this statement and comments of the retail dealer on this subject will bring some light on the hydrated lime proposition and no doubt will be beneficial to the dealer and manufacturer.

Terry & Lewis, of Galesburg, are putting in a good many culverts, bridges, etc., which consume more or less cement in their section. They report big business in 1905 and look forward to material increase in masons' supplies handled by the retailer in 1906.

A dealer told a story the other day illustrating what high price of lath is doing for the plaster board and metal lath. He said: "I was looking around a new building recently and several boys were straddling laths, you remember what good stick horses they make. I heard the sequel of the story. In a few moments the plasterer stuck his head out of the window and said: 'Leave those lath alone; they cost half a cent a piece.' The lath was formerly put in the refuse burner at the saw mill. At the present price of either Norway or yellow pine lath, plaster board and metal lath have their opportunities and if they do not take advantage of it by getting in touch with the dealer, they will be the losers. There is no doubt about the satisfaction that these two new productions will give the trade and the possibilities for their increased consumption is apparent. There is one suggestion—the manufacturer who makes the plaster board ought to have more mortar on it. In the metal lath the plaster cannot get away. Put the mud on. The chinks are there and must be filled."

In this connection I was reminded with a little conversation with a dealer, who said: "When a new brand of plaster was introduced in my section there was a hard headed Scotch plasterer, who was pretty good and thought he knew all about plastering, and refused to use this new plaster owing to his prejudice, and favored mortar. The dealer had a friend, who was building, to specify this plaster. The plaster friend came down one day and wanted a sack of Acme cement. He got the cement and the second story of the building was plastered with Acme cement. It still stands there like a Washington monument, but the color wasn't exactly right so the plasterer came back and raised Cain. He thought he had his inning and would be able to get even with the dealer and go back to put mortar on instead of patent plaster, and so when he was informed that he had put on

Acme cement, he said: 'For Heaven's sake, don't tell the man.' He now believes in all things that are new and are good and the dealer will recommend him." This story was told to illustrate the troubles of the dealer who in introducing new materials, must know, himself, the whys and wherefores of the material, and after he is able to educate the contractor, he must break down prejudice as well.

Charlie Glore, of Centralia, in speaking about cement shipped in sacks, said: "We prefer the paper sack if the paper is strong enough to protect the cement. I find that these long freight trains with heavy engines push the cement around so there is more or less breakage in the bag. The manufacturer in loading this stuff on the car, puts paper on the floor, but these box cars being used for various things, there are often nails in sides or in the floor and there is a breakage in the package. However, it seems to me that this is less trouble than giving the sacks out to contractors, sometimes getting them back in six months after, sometimes not, and where you charge the man with it he thinks he is paying ten cents more always for cement and this makes him prejudiced against same. The greater use of cement to the dealer, however, is here to stay and as the years go by the increase will be evident."

Another dealer speaking about growth of the cement business, said: "I think some dealers are wrong in their ideas about the selling price of cement. I don't believe in trying to get one hundred per cent. profit, and while I need the money as much as any one in the business, the farmer is a pretty good buyer. If we charge him \$4.00 a barrel for cement and if he finds out in a neighboring town he can get it for \$3.00, then we are in trouble. Besides if the dealer is to handle cement in large quantities he must encourage its use and if the price is too high, some other substitute will be used."

Cement brick is being sold in Illinois at \$8.00 a thousand and competing with clay brick. The cement brick is giving good satisfaction and the dealer in speaking of the matter said: "We had a nice business this past year, making our own brick and supplying our trade. The prejudice in favor of the cement brick is fast disappearing and the clay brick will be a thing of the past in the section where we can get the raw material cheap enough. We find for instance in the case of chimneys that people are beginning to prefer cement brick chimneys."

One of the visitors to the meeting was J. H. Shuck, of Springfield, the old time dealer in Illinois. Mr. Shuck was one of the pioneers of the Illinois Retail Lumber Dealers Association and was its president for two terms. He is just as much interested in the retail business as ever before and favorable to associations. He looks hale and hearty as when we first knew him twenty years ago.

Say, that Danville bunch came out en masse with Dean Holden as the dean of the faculty. Their presence indicated that Danville has been somewhat of a dumping ground for the manufacturer and they desire to get the protection they deserve, and in turn give the manufacturer a friendly welcome and endeavor to co-operate with him.

The modern retailer of building material nowadays is putting up substantial sheds for his lumber and in this shed he builds a house for lime, cement and plaster. Charlie Glore, of Centralia, has such a building sixteen by thirty-two. These three bins will hold a carload each and with double walls with roofing paper between and flooring instead of ceiling, this lime, plaster and cement house is very cool in the summer time and the gentleman claims he has no trouble from slack lime. If a man by a little increased investment can secure decreased waste and take better care of his material, he will find it easier to get a better price for it.

Centralia, Ill., is putting down Culver Brick Block with a hydraulic cement base. The contractor is John Cherry, of Jacksonville, Ill., and the Western Cement Co., are furnishing most of the material through one of the old time lumber salesman now operating a lumber yard at Centralia—L. M. Bostwick.

G. W. Hotchkiss, the veteran secretary of the Illinois Retail Lumbermen's Association, carries his seventy years with the grace of a man of thirty. He is the same kind of a man of old, we all remember since our boyhood days, and welcome with open arms because we like him to be with us. When he is on hand he is just as young as the rest of us.

J. A. Bryden, of Alexander Lumber Co., who with S. R. Cornish Lumber Co., have forty-four yards in Illinois, said: "Most of our yards handle lime, cement and plaster. We find an increase in the use of these materials as the years go by and we agree with you that it is only a question of time when rock product lines will be a large part of our business. We find in 1905 our numerous yards had a good business and we anticipate a good demand for 1906."

L. C. Watson and L. E. Rice, of the U. S. Gypsum Co., represented the U. S. G. very well. They seem right at home in the brick business. The U. S. G. Co. have a distributing warehouse at Springfield and it was discovered at this meeting as well as heretofore that the policy of the Gypsum Co. is to cater to the dealers' trade.

Peter Vredenburg, Jr., of Springfield, makes an ideal presiding officer. He has been a yellow pine manufacturer for a number of years and is glad to get back in the harness as dealer in building materials.

The Car Register.

One of the most progressive members of the Builders' Supply Association showed us a few weeks ago an account book which he calls his "car register." The page is about 18 inches wide and is specially ruled having headings for description of the car, its number, the contents, the date received, the disposal of the contents, what line it was shipped by, on what siding received, when paid, etc., thus making a complete record of the transportation, the receipt and the disposal of every car of material handled by the establishment; and besides this, it constitutes a complete ticker of the supplies of every kind of material on hand and giving the minute details as to its location.

Such a register obviates many of the difficulties that the builders' supply dealers all over the country have to contend with, and we are sure that many of the men who are constantly finding surprises in the amount of stock which is on hand in their warehouses can benefit their systems of doing business to a great extent by introducing such a book into their accounting department.

It is certain that a man who has once employed a method of this kind will never discard it, for in the builders' supply business especially, it constitutes a whole set of books and a constant balance sheet all at the same time.

Desire to Enlarge Their Lines.

A large builders' supply company located at Winnipeg, Manitoba, Can., are prepared to handle one or two first-class commodities in the builders line. This concern is one of good financial standing and desires to increase its business by the addition of a larger number of supplies. Those who might care to consider the proposition can address P. O. box 781, at the above place. It might be worth their while.

Erected New Warehouse.

BALTIMORE, Md., January 24.—The National Builders Supply Co. write us: "Owing to the open weather our business since the first of the year has largely increased. The general outlook is bright, and, as far as we can see, everyone engaged in our line of business, is unusually busy. We expect shortly to occupy our new warehouses, which are the largest of the kind in the South, and we will in all probability send you a picture of same later on."

Prospects Very Fine.

WICHITA, KAN., January 26.—J. H. Turner, a large operator in builders' supplies, writes us: "Regarding the business outlook for the next year, will say we have every prospect for a still increased business in 1906 over 1905. While there has been an immense amount of business done in this and surrounding territory the past year, everything seems to point to a greater volume of business during the present year. The prospects for large buildings to be erected this year exceeds anything we have had in the past and we look for a prosperous year."

The Ralfe Building Materials Co., of New Brunswick, N. J., has been organized to deal in stone, lumber, etc. The incorporators are: John H. Ralfe, Harry J. Ralfe and Isalah Ralfe. The capital stock is \$100,000.00.

Careless Way of Handling Cement.

It was in front of one of the largest establishments in the United States that makes a business of handling builders' supplies. The day was damp and murky, the kind of a humid day that one finds in mid-winter in the central South. A two horse wagon was backed up, and from a huge bin where cement was stored in bulk, two men with scoop shovels were transferring it into the wagon in this wise; one workman would push his scoop under the pile of cement and fan it through the air about six feet, another workman would scoop it up from the floor and toss it into the wagon. This intelligent (?) process was continued until the bed of the wagon containing about two cubic yards was almost filled level with cement, then a tarpaulin was carefully spread over the load, the driver took his seat and drove off to deliver—what? Would you call that cement? No, we would not dare call it cement.

Now this material was going into the foundation of a large building in the shape of concrete, and from it the footings for a very heavy super-structure were being put in. If that concrete should chance to fail, the cement manufacturer would probably get a letter of inquiry to know what was the matter with that shipment of cement. Now who thinks that he is in a position to make an intelligent examination, and that would be the result of an explanation of the concrete made from this cement if it should fail, which it probably will? At least, in the view of such carelessness it ought to fail and that builders' supply concern should be made to pay the damages.

There is no use in dodging the issue. The cement manufacturers have a right to know whether their agents handle the product intelligently, and there is no equitable come-back on the manufacturer for a concern which handles such delicate materials as cement and lime in any such outrageous manner. Outrageous, because the manufacturers of these materials are required to make them up to a very high standard and the safety of life and limb of the citizens of this country depend upon the integrity with which these goods are manufactured, and this integrity must be preserved until it goes into the finished work.

If the contractor is responsible for his work, the dealer is responsible to the contractor for the kind of material he furnishes, and the manufacturer is responsible to the dealer for the quality he supplies. Every fellow should bear his part of the load, his part of the responsibility and give his personal attention to his business and so secure for the materials he handles the confidence of the public, which is the paymaster of us all.

The Several Dayton Dealers.

DAYTON, OHIO, December 28.—A visit to the several dealers in builders' supplies here found them all busy and well satisfied with the year's business. The outlook is encouraging and the general situation is good.

Schaeffer & Gengnagel.

Schaeffer & Gengnagel are jobbers and retailers of coal, sewer pipe, building material, Portland and hydraulic cement. Their office and storerooms are located at 812 to 828 E. First Street. Mr. Schaeffer said that they had had a very good business as there had been considerable building done in Dayton last summer and fall. The outlook for a big business in the spring is exceptionally flattering as many large buildings have already been contracted for and several more large ones are contemplated.

T. D. Eichelberger's Sons.

T. D. Eichelberger's Sons, dealers in builders' supplies, report business as exceptionally good. Dayton has been enjoying quite a building boom and this firm came in for a lively share of the business. Their office and plant are located at Fifth and Pearl Streets. Mr. Eichelberger is one of the best posted men in the business and keeps abreast of the times. They furnished the cement used in the reconstruction of the Catholic Church mentioned in another part of the paper.

Dayton Fiber Plaster Co.

The Dayton Fiber Plaster Company, whose office and mill are located at Shawnee and Wyandotte Streets, are one of the oldest firms in the business. They have had a good run of trade and have no complaint to make. This firm make a specialty of shipping the product of their factory in a mixed form ready for use.

A Subject for Consideration.

The overloading of floors is a subject that should receive careful consideration on the part of the builders' supply people and all others who manufacture materials generally handled by this class of dealers. Cement, lime, plaster and other commodities which, of their very nature, are weighty, naturally demand floors of more than ordinary strength in order to support this weight.

Accidents, more or less fatal, have frequently been the result of carelessness in constructing buildings whose floors—and not infrequently the walls themselves—were erected by consciousnessless builders who disregarded the fundamental principles of construction. Some of the blame must likewise rest upon the supply dealers and manufacturers who overestimate the carrying capacity of floors, in some cases, with the above result.

The value of human life, to say nothing of the material loss is too frequently given only a passing consideration. When the disaster comes it is too late to make proper amends for the damage is done. The precaution should be taken beforehand. Careful examinations of the tensile strength of floors should be enforced by law and weight carrying capacity of such floors never allowed to exceed their prescribed allotment. These are considerations for all those interested in the manufacture or sale of weighty commodities, and the sooner greater care is exercised the quicker disasters will be entirely overcome.

Advantages of the Wooden Package.

While in some respects the bag may have advantages over the barrel as a package for storing and shipping cement, plaster, lime and other commodities, the latter is in many ways preferable. The reasons for this are obvious to one who gives the subject a reasonable consideration. In damp or rainy weather the bag is an unfit package for any of the above articles; while the loss by breakage from various causes often amounts to considerable.

The barrel is, while more weighty, a package that can be more readily handled. It is far less likely to break and has the advantage of a greater carrying capacity. These are considerations for the builders' supply men, not only those who have bin storage for cement, lime, etc., but for the smaller dealers as well, who must store their purchases in the original packages.

Perhaps these are considerations which have been too frequently lost sight of by the average supply man, and the advantages have been unappreciated. The bag is the popular idea, but the dealer of to-day can not cater to fads unless by so doing he gains in the end. Therefore he must be on the alert for the best and cheapest means of conducting his business.

Organizes New Concern.

TOLEDO, OHIO, January 8.—W. O. Holst, a widely known and popular gentleman who has been connected with the Ohio Builders' Supply Co., has sold his interest in that concern and will open a large and modern plant here under the name of the W. O. Holst Builders' Supply Co. Mr. Holst is popularly known as Billy and his many friends wish him success in his new undertaking.

The Rock Diamond Co., has been incorporated at Paterson, N. J., with a capital stock of \$50,000.00. The company will deal in brick, stone, lumber, coal, etc. Peter S. VanKirk, Harold Bang, Leonard De Witt and William D. Ackerman, all of Paterson, and Walter D. Vanderhoof, of Wyckoff, N. J., are the incorporators.

The Obermann Brick and Supply Co., Newark, N. J., has been organized to deal in builders' supplies, and engage in building and contracting. The capital stock is \$25,000.00. George R. Obermann, Glen Ridge, N. J., Charles F. Mackin and Charles F. Mackin, Jr., are the incorporators.

The Builders' Trucking and Material Co., has been incorporated at Catskill, N. Y., with a capital stock of \$25,000.00. The company will manufacture and deal in building material and do trucking. Jas. Smith, Jas. V. Camardella and William Heltesheimer, all of Brooklyn, are the incorporators.

The Stacy & Wilton Co., of York City, Pa., has been organized by John W. Stacy and Edwin W. Stacy, of York City, and Silas F. Wilton, of Wrightsville, Pa. The capital stock is \$50,000.00. The company will deal in lime, brick, cement, limestone, plaster and artificial stone.

Side Talk.

Cementology, the little speaker of The Whitehall Portland Cement Co., edited by Mr. Howard B. Green, in its January number is devoted to "The Standard Requirements of Portland Cement." We know from our correspondence that it contains the very information that a great many cement users need in their business. A line to Mr. Green at Philadelphia, or any of their many agencies will secure a copy of it.

The Jeffrey Manufacturing Co., Columbus, Ohio, have a folder upon the subject of their swing hammer pulverizer showing four styles and sizes of that unique machine adaptable to a wide range of fine pulverizing requirements. One of these will be found more than useful in the plants of progressive artificial stone manufacturers in the preparation of their material.

A letter from Mr. W. E. Austin, general manager of the Southern Mining and Power Machinery Co., states that they have moved the general Southern offices to the Chandler Building, Atlanta, Ga., where they will have more commodious quarters to receive their quarry friends and exhibit their line of McCully gyratory stone crushing machines.

The Biles Dryer Co., Louisville, Ky., manufacturers of drying machinery and presses for all purposes, states that Mr. W. A. Marvin will be associated with that company in future in the capacity of assistant manager. In future he will carry upon his banner the well known device of the company, "Dry up your troubles."

The Ricketson Mineral Paint Works, Milwaukee, Wis., the well known manufacturers of mortar colors "that stay" have just received the diploma from the managers of the Universal Exposition, of St. Louis, which states they have received the highest reward for mineral paints and mortar colors exhibited in St. Louis.

The Main Belting Co., Philadelphia, Pa., have just completed an addition to their plant which increases their floor space area about 230. The four floors are in the addition 45x100 feet. They are issuing a very handsome calendar with the compliments of the season to the trade.

The Waterloo Cement Tile Machinery Co., of Waterloo, Iowa, has been organized with a capital stock of \$50,000.00, of this amount \$30,000.00 is paid up. The officers are: John M. Schenk, president; Frank J. Pfiffner, vice president; Albert E. Pfiffner, secretary, and John H. Stewart, treasurer.

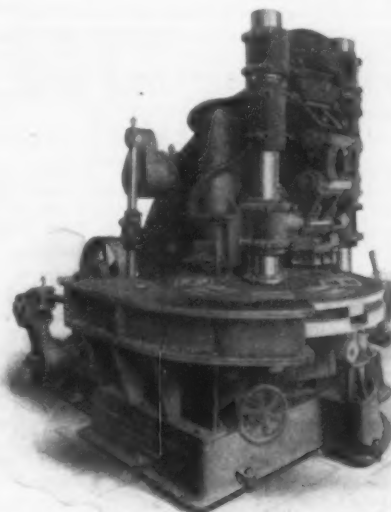
The Coen Building Material Co. is a new wholesale and retail building material and supply house in Kansas City. They have office and warehouses at Fifteenth & Askew Streets. They will handle all kinds of building material, lime, cement, plaster and other specialties. They are territorial agents for the Western States Portland Cement Co., of Independence, Kas.

The Garry Iron and Steel Co., Cleveland, Ohio, manufacturers of roofing and roofing supplies of high qualifications, report a very successful year's business, with prospects still greater for the coming year. The company has recently been reorganized to enlarge the scope of its operations and usefulness. Mr. George D. Wick, one of the best iron and steel men in the United States, has become president; Mr. C. S. Bigsby is vice president and Mr. W. A. Kingsley is secretary and treasurer. This constitutes a very strong combination for each of these gentlemen have had a great deal of experience in the iron and steel business.

The Concrete Engineering and Equipment Co., Butler, Pa., and Greensboro, N. C., has issued a booklet fully describing and illustrating the "Cochran" wood fiber machine. They make five cardinal claims for the superiority of their machine. It

has neither sprocket wheels nor chain, cog wheels nor cone pulleys to break, clog, or get out of order. It has an entirely automatic continuous increasing speed mechanism. It has a log carriage which automatically returns to position and at the same time stops the log revolving mechanism without being touched by the operator. It can be operated with very little power and will make more and better fiber in a given length of time than any other machine. It is the only machine in which all the operating mechanism is protected against fiber and dust. It is claimed for the "Cochran" that it is built for service, simple and compact in all its parts and last, but not least, reasonable in price.

The National Brick Machinery Co., 817 Chamber of Commerce Building, Chicago, Ill., report that they have just installed in the works of the Holland Brick Co., Holland Mich., a new type of rotary press for the production of sand lime brick. Speaking of the machine in particular, they say: "This machine was invented and designed by Mr. P. L. Simpson especially for the sand-lime brick-makers, and there is no doubt of its success, as it has features that have not been incorporated in any other brick press. The machine makes two bricks with each revolution of the master gear, and turns out about 16,000 high grade sand-lime



ROTARY BRICK MACHINE.

brick per day. The bricks, after pressing, are lifted off without being subjected to moving of the form moulds upon a front table, thereby securing perfect edges and corners.

"The machine is extra heavy, the side bars having a sectional area of nearly 30 square inches, and everything else to correspond. We claim that this machine fills the want that has been decidedly lacking in the manufacture of sand-lime brick."

The Perfection Block Machine Co., Minneapolis, Minn., claim that their process for the manufacture of hollow block is the only one in which the block is molded under high pressure. The Perfection machine has been very successfully used in sand-lime brick plants for the manufacture of rock out of the same material which is used in the manufacture of sand-lime brick. These blocks are made on slate palates and placed in the hardening cylinder upon the same truck that is used for loading the brick and when hardened under steam pressure in the usual way a very fine quality of manufactured sandstone is produced. The plain blocks so made are suitable for belt courses, foundations, and trimmings for buildings that are constructed of sand-lime brick or the whole building can be constructed from material made with their machine.

In undertaking the construction of large buildings, it is often desirable to have the first story constructed of sandstone and the balance of brick, thus relieving the monotony of appearance, and such a combination has proven to be very desirable, very satisfactory and successful in the hands of the progressive people who are pushing their industries on the most intelligent lines. Mr. Sawyer says some of the blocks exhibited at the recent Detroit convention were made upon the Perfection machine.

The Bates Valve Bag was introduced to the lime manufacturers at the Chicago convention. It is being exploited by The Urschel-Bates Valve Bag Co., Woodville, Ohio, who say, "There is no difficulty for us to convince the manufacturers of hydrated lime that we have to offer the most economical and profitable proposition for packing their products that has ever yet been offered. An investigation invariably terminates in a sale and the cement manufacturers and producers of gypsum are just as much interested in it as are the lime men. Our proposition is the difficulty of getting the machine and supplies ready fast enough to take care of the orders that are being constantly presented. There is no concern in any of these lines who does not hail with joy the escape from all the troubles that have heretofore beset the packing department. We have the sovereign balm for all such troubles and it is becoming more widely recognized every day."

CALENDAR LORE.

As is customary a number of large concerns have favored us with their yearly date finders, which are always acceptable gifts. We mention these separately below, giving each its particular note of comment.

THE TONINDUSTRIE ZEITUNG, of Berlin, Germany, has published a calendar in three parts. It is richly bound and contains a daily memorandum calendar.

TROW & HOLDEN, Barre, Vt., the well known manufacturers of granite working tools, send out a neat calendar in brown, entitled, "Autumn." It is a classic picture of a girl, symbolizing the season, and is in many ways attractive.

THE ECLAT GRANITE CO., manufacturers of granite memorials, Barre, Vt., have issued a beautiful calendar of two varied classic figures in transparent colors. This souvenir is one that deserves particular notice on account of its chaste design.

THE VULCANITE PORTLAND CEMENT CO., New York and Philadelphia, send us an ideal office calendar, with their trade mark in three colors.

THE BINNS STUCCO RETARDER CO., of Uhrichsville, Ohio, have issued their annual calendar in red and blue, which makes such a splendid date finder to the busy office man.

THE BALTES SUPPLY CO., of Fort Wayne, Ind., have issued a beautiful calendar. The subject is a nude and the title is "The Sun Bath." No doubt the Baltes Supply Co. have already exhausted their supply of these calendars, as every one who sees them is sure to want one.

THE WETMORE & MORSE GRANITE CO., whose quarries are at Barre, and whose office is at Montpelier, Vt., have sent out a very artistic calendar. It is a photogravure entitled, "An Old New England Mill." The picture is worthy a frame and a place on any wall. It represents an old mill and some little children fishing in the water below the mill.

THE ASH GROVE WHITE LIME ASSOCIATION, of Kansas City, Mo., have sent their 1906 greeting in the form of a magnificent reproduction of one of Paul de Longpre's famous pictures. As every one knows Paul de Longpre is the most celebrated flower painter in America. The subject is a vase of American Beauty roses and Lilies of the Valley.

THE CARSON LIME CO., Riverton, Va., have sent out an attractive calendar of six pages portraying Cupid and a soldier girl, in bright colors. It is in many ways an ideal date finder.

THE CLIMAX ROAD MACHINE CO., at Marathon, N. Y., have issued a neat calendar showing several views of their machine and two country road scenes. It makes a nice advertisement for this concern and combines several features to attract the beholder.

THE HUNKINS-WILLIS LIME AND CEMENT CO., of St. Louis, Mo., send out a calendar entitled "Progress." It is the raised head of a pretty woman, mounted on black and gold. It is a calendar which possesses a peculiar attractiveness and appeals to you for its purity and simplicity.

JONES BROS. CO., Barre, Vt., large quarriers and operators in granite, have issued an attractive calendar printed on highly calendared paper, illustrating a series of scenes in their quarry and shop. It makes a nice office calendar and deserves special mention.

The Exhibit Feature at Minneapolis.

(Continued from page 54D.)

H. S. Quick & Co., of Indianapolis, Ind., exhibited the Monarch cement post machine.

A. L. Thomas & Co., Anoka, Minn., demonstrated the Helm Cement Brick Machine. This is a machine adapted to making cement brick under pressure by hand and the delegates manifested great interest in the operation of this device.

The Western Portland Cement Co., of Yankton, S. D., manufacturers of the "Yankton" brand, was represented during the convention by Mr. C. B. Mc. Vay, who had charge of a handsome exhibit where he welcomed friends and prospective customers.

Mr. L. V. Thayer, president of the Peerless Brick Machine Co., of Minneapolis, knows what is needed to attract the American people. This is demonstrated by the fact that a large number of delegates curiously watched as cement brick were turned out of the wonderful "Peerless" machine faced with twenty dollar gold pieces. The "Peerless" machine was operated during the entire convention and thousands of brick were made. A novel sight was that of interested delegates standing around, watch in hand, timing the work of the little machine. Some record time was made. Besides Mr. Thayer, Mr. H. E. Storms and Mr. L. E. Storms, both members of the Peerless Co., aided in the work of the exhibit.

The scene about the Atlas Portland Cement Co.'s exhibit was one of good fellowship for Messrs. T. M. McGiff and B. L. Swett, of New York, and Mr. F. W. Clayton, of Chicago, greeted every one with hearty handshakes and pleasant smiles. Every visitor to the "Atlas" stand received a handsome pocket date book, a valuable souvenir of the convention. The Northwestern Lime Co., who are agents for the famous "Atlas" brand was represented by Mr. John Whorrey, Mr. F. M. Williams, and Mr. E. J. Sigwalt.

The H. S. Palmer Hollow Building Block Co., of Washington, D. C., was ably represented by Messrs. H. H. Swan and J. D. Wood who showed the good points of the Palmer machine. This company had an extensive exhibit at Milwaukee.

Mr. H. M. Gardner, of Minneapolis, was on hand with an exhibit of the Gardner Hardware Co., of that city, an up-to-date retail hardware firm who displayed all kinds of sidewalk tools.

The Brookings Cement Block and Sidewalk Co., of Brookings, S. D., presented a very interesting exhibit, and this was under the supervision of Messrs. O. Johnson and C. H. Atkinson.

The Mandt-Powell Concrete Machinery and Foundry Co., of Stoughton, Wis., were handing out some bank accounts to every one about the convention. It looked like real money but the cement crowd wouldn't accept it and something must therefore be wrong.

Wanted and For Sale

One insertion, 25c a line; Two insertions, 50c a line; Three consecutive insertions with no change in the composition, 56c a line. Count eight words to a line; add two lines for a head

WANTED—HELP.

AN EXPERIENCED man to take charge of plaster department, one who is fully capable of looking after the mixing, etc., a man of practical experience. Address HOWARD HYDRAULIC CEMENT CO., Cement, Ga.

AN EXPERT BLASTER—No other need apply; work the year around; blasting limestone to load with steam shovel; wages to right man \$100.00 per month. Address D-Z 1, care Rock Products.

BUSINESS MAN conversant with and able to take charge of cement stone plant. Will pay salary or percentage of profits. Opening is good for a hustler. Address B Z 3, care Rock Products.

GOOD MAN thoroughly conversant with cement stone business, to take charge of plant; am willing to pay salary or percentage of profits. This is an exceptional opportunity. Address B Z 4, care Rock Products.

CUT STONE CONTRACTOR—In old established quarry district, a cut stone contractor of a firm of cut stone contractors to operate in conjunction with quarry company, possessing latest and most complete equipment in all departments; decidedly favorable terms can be obtained at this time; small capital required to equip cutting plant; parties familiar with the West and Southwest preferred. Address F-Z-5, care Rock Products.

COMPETENT MAN—Who can secure entire crew, to take charge of steam shovel outfit for stone quarry company in Nebraska; reply giving age, experience and salary expected, to F-Z-4, care Rock Products.

FOREMAN—For stone quarry and lime works in Wisconsin; must be sober and systematic and be experienced in drilling, blasting, lime-burning, machinery and shipping. State experience and references. F-Z 6, care Rock Products.

LIME MAN WANTED—One thoroughly familiar with lime manufacture, to take a position with a good future. Must furnish best of references. Address F-Z-2, care Rock Products.

PRACTICAL MAN—To take charge of rock grinding plant; one with knowledge of paint manufacturing preferred. State salary and experience fully. Address THE STASO CO., Boston, Massachusetts.

SUPERINTENDENT plaster plant. A man who is experienced in the manufacture of hard wall plaster, and is capable of taking full charge of a modern plant. Address B Z 5, Rock Products, giving references and salary expected.

SUPERINTENDENT—For stone crushing plant, must be capable machinist competent to handle plant of 2,000 tons capacity. Address F-Z 1, care Rock Products.

SUPERINTENDENT—For stone quarry, familiar with locomotives, steam shovel and stone crushing machinery; crushed stone only produced; reply, mentioning salary expected and giving age, experience and references, to F-Z-3, care Rock Products.

SIDEWALK FINISHER AND FOREMAN—Experienced for concrete block plant; a competent man to figure out and superintend block construction preferred. Business established five years; employment nearly all the year. Address TUSCALOOSA CONCRETE CO., Tuscaloosa, Ala.

BUSINESS OPPORTUNITIES.

NOTICE!—Cement Block Machine Companies—For \$1.00 I will furnish you 106 names and addresses of parties who have purchased my formula for making artificial stone. All those parties are interested and in the market for block machines. Every section of the globe is represented in those 106 names. JOHN O'CALLAGHAN, 1521 Main Street, Baton Rouge, La.

AGENCY—We wish to take the agency for Spokane and vicinity for the best general line of building material on the market—including portland cement, pat plaster, prepared roofing, metal lath, etc. Address, R. D., HOCK FUEL CO., 1321 1st Ave., Spokane, Wash.

PARTNER with capital to engage in manufacture of a new hard plaster; a hydraulic mortar composition showing great merits and large profits. Address A. C. SCHULZ, 53 Lincoln Avenue, Detroit, Mich.

THREE HUNDRED AND FIFTY ACRES, all underlaid with 6 ft. vein Portland cement rock, cannel and soft coal, a fine shale, best quality of fire clay, potters' clay, pyrolusite and manganese mine, lime and sand rock, both of the best quality, and fine bed of gravel and sand; abundance of heavy oak timber; price, \$20.00. A splendid proposition. Address J. H. McDONALD, Sidney, Iowa.

FOR SALE—MACHINERY.

GATES CRUSHER—Style "D," No. 4, located at Akron, N. Y., good as new, great bargain; write for particulars to AKRON STONE CO., Akron, New York.

NEW BROUGHTON PLASTER MIXER—With four bag spouts; latest pattern, single chamber machine. Address THE OHIO RETARDER CO., Port Clinton, Ohio.

ONE NEW No. 16 Smidth Tube Mill, complete, with clutch, shaft, pulley and Silex lining. For particulars address ILLINOIS HYDRAULIC CEMENT MFG. CO., Utica, Ill.

WANTED—MACHINERY.

BEST PRICES—On new or second hand sand dryer and hard wall plaster mixer. Address THE WELLAND LIME WORKS CO., Ltd., Port Colborne, Ont., Canada.

WANTED—POSITION.

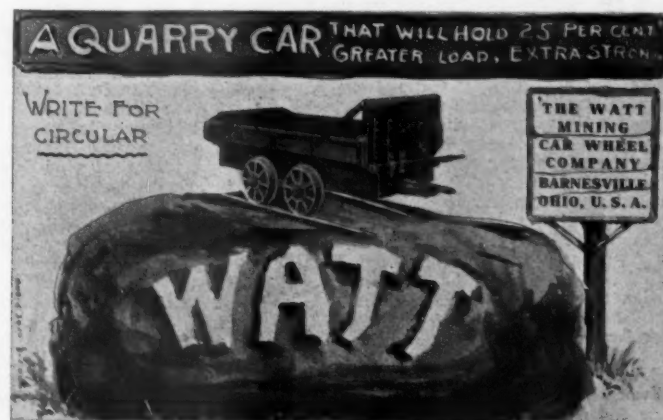
CEMENT MAN—With 15 years experience in inside management of large mills and sales both in United States and abroad now open for similar position. Address F-Z 7, care Rock Products.

FOR SALE—PLANT.

FOR SALE—A good gas burned white lime plant. Fine facilities right in the center of a good market. Partner with some money can get a profitable investment. Address E H D. Care Rock Products.

FOR SALE OR LEASE—Siluria Lime Works, capacity 150 barrels a day; quality of limestone unexcelled and inexhaustible. Situated at Siluria, Shelby Co., Ala., on the main line of L. & N. railroad, 20 miles south of Birmingham. For further information address DR. E. WAGNER, Montgomery, Alabama.

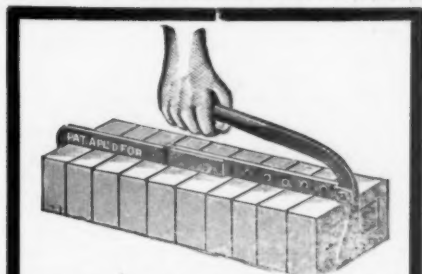
GAS BURNED WHITE LIME PLANT—Fine facilities right in the center of a good market; partner with some money will find it possible to make a profitable investment. Address E. H. D., care Rock Products.



AUTOMATIC SCALES

RICHARDSON SCALE CO. NEW YORK, CHICAGO.

BRICK CLAMPS MAKE MONEY.



THE ONLY TOOL TO HANDLE BRICK.

**SAVES MONEY.
SAVES BRICK.
SAVES TIME.
SAVES HANDS.**

Why handle brick in the same manner as the Ancients?

Buy a pair of Brick Clamps and be up-to-date. Unload one car of brick and you save the cost of this appliance.

50c to \$1.00 per thousand on Pressed Brick alone, saved by no chips.

Street contractors, save your pavers 33 per cent. labor by carrying brick from curb instead of dumping from a wheelbarrow. PRICE \$2.50 EACH.

Houston Brothers Company

32d Street and Penna. R. R. PITTSBURG, PA.

**Peirce
City
White
Lime**



**STRENGTH PURITY
Ste. Genevieve Brand
WHITE LIME**

Will work smoother, go farther and combine with cement better than any other known brand

CLIFFDALE LIME CO.
STE. GENEVIEVE, MO.

**NATIONAL WALL PLASTER Co.,
OF AMERICA**

MANUFACTURERS OF

Gypsum and Calcined Plaster.

539 Onondaga County Savings Bank Building,

SYRACUSE, N. Y.

Cement Brick Machines

From \$25.00 and up
Capacity 1,200 to 48,000 per day.

Building Block Machines

From \$50.00 and up
Capacity 150 to 600 per day.

Concrete Mixers

From \$75.00 and up
Capacity 1 1-2 to 15 yds. per hour.
Power Tamper.

MOLDS

for Cap and Sill, Columns, Base Ball Baluster and Spindle, Sewer and Conduit Pipe, Sidewalk Tile, Roofing Tile, Fence Posts.

A. D. MacKAY & CO.

84 Washington Street,

CHICAGO, ILL.

Machines and Presses

For Concrete and Clay Products of all kinds.

CARS, roller bearing, for Concrete Block, Clay Brick, Dumping and Warehouse Cars of all description. Write us for Catalogs.



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50 FALL STREET,

CLEVELAND, OHIO.

Hand Made ——— Hard Burnt
FIRE BRICK

— are the best for —
Lime and Cement Kilns

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St. Louis, Mo.

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(Incorporated.)

SHEET-METAL and HEATING CONTRACTORS

MANUFACTURERS OF

GALVANIZED IRON AUTOMATIC FIRE-PROOF WINDOWS, CORNICES, SKYLIGHTS, TANKS, ETC., SLATE, TILE, TIN AND IRON ROOFING, SHEET-METAL CEILINGS, WARM AIR FURNACES.

Office and Factory, 601, 603, 605 E. Jefferson St. LOUISVILLE, KY.

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OF EVERY TYPE

CONSTRUCTED FOR ALL PURPOSES.

BEFORE PLACING YOUR ORDER CONSULT

UNITED STATES DRYING ENGINEERING CO

66-70 BEAVER ST., NEW YORK, U.S.A.



Tell 'em you saw it in ROCK PRODUCTS.

Business Directory.

The names opposite which numbers do not appear, the advertisements will be found in the first issue of the month.

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Steam Stone Cutter Co. 5
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GRANITE MONUMENTAL.

Ahern, James
Abbiatti, E. & Bros.
Anderson Bros. & Johnson
Anderson, A. & Sons
Barre White Granite Co.
Billodeau, J. O.
Beck & Beck
Bishop, Joseph
Boutwell, Milne Varnum Co., The
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Drennan & Brown
Doucette Bros.

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Giudici Bros.
Granite Railway Co., The
Mannex, T. F.
McDonald, Cutler Co.
McMillan, C. W. & Son
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Oklahoma Granite Co.
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Robar, Fred J.
Robins Bros.
Smith & Marshall
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Shaw, Willis
W. H. Anderson & Sons, Detroit, Mich.
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Yale & Towne Mfg. Co.

HOISTS DOUBLE FRICTION.

Yale & Towne Mfg. Co.

HOSE.

Dallett, Thos. H. Co.

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American Hydrating Co., The 70
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Clyde Iron Works 11
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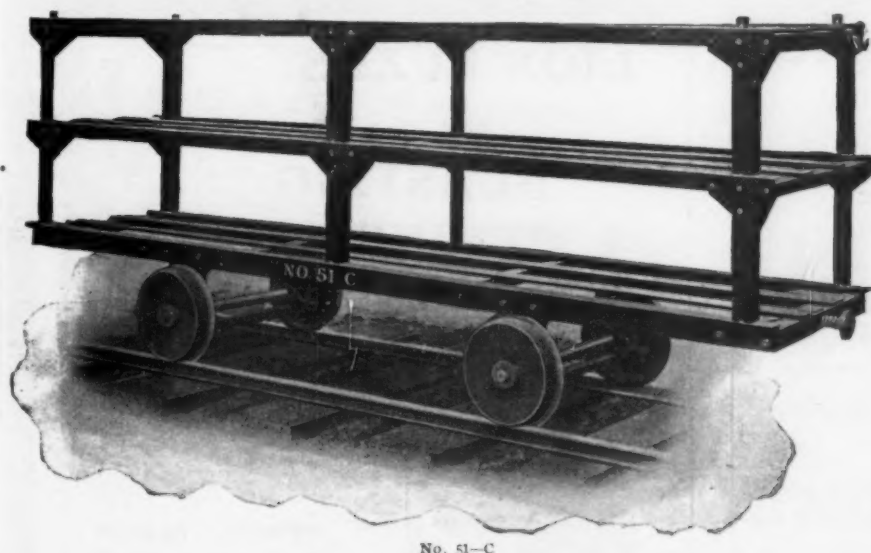
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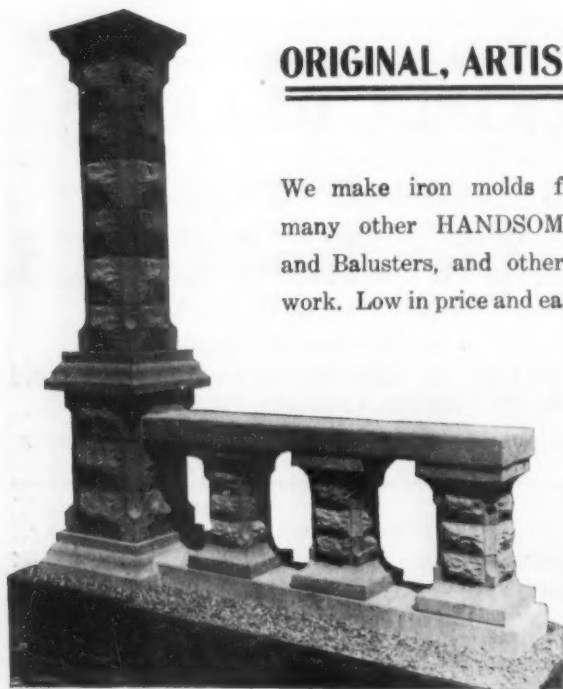
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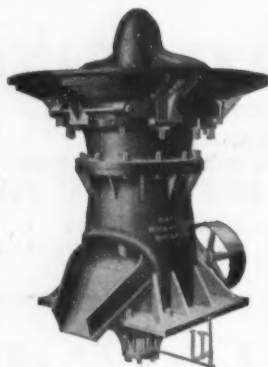
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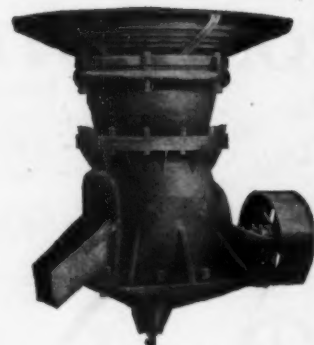
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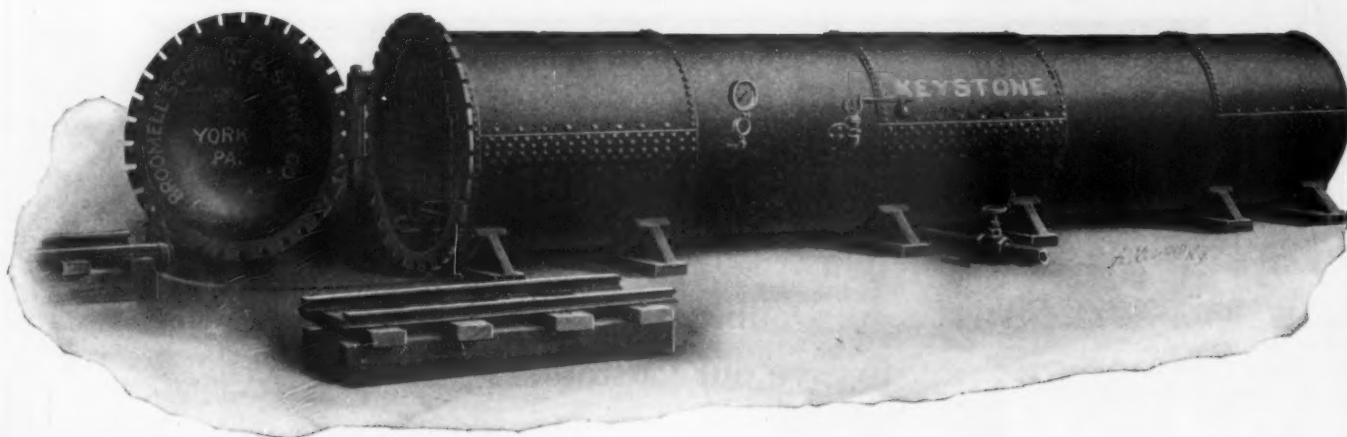
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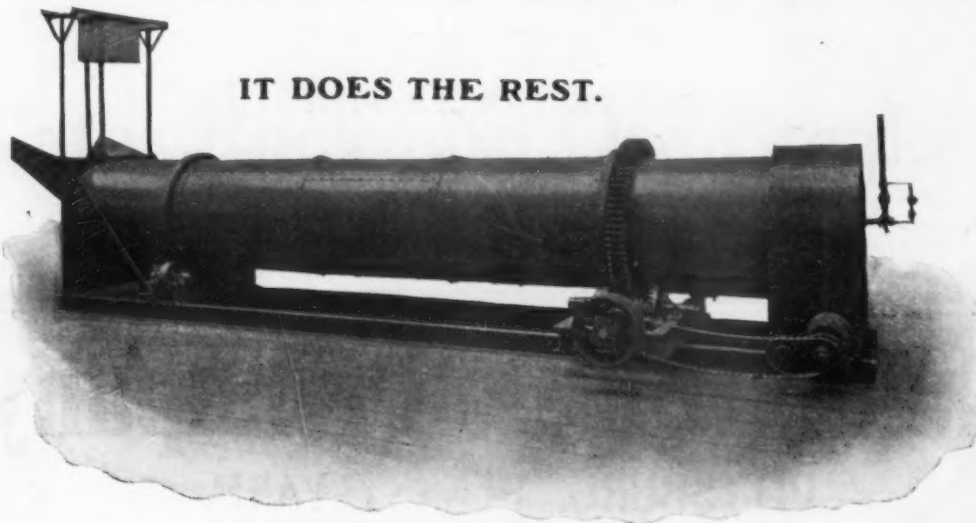
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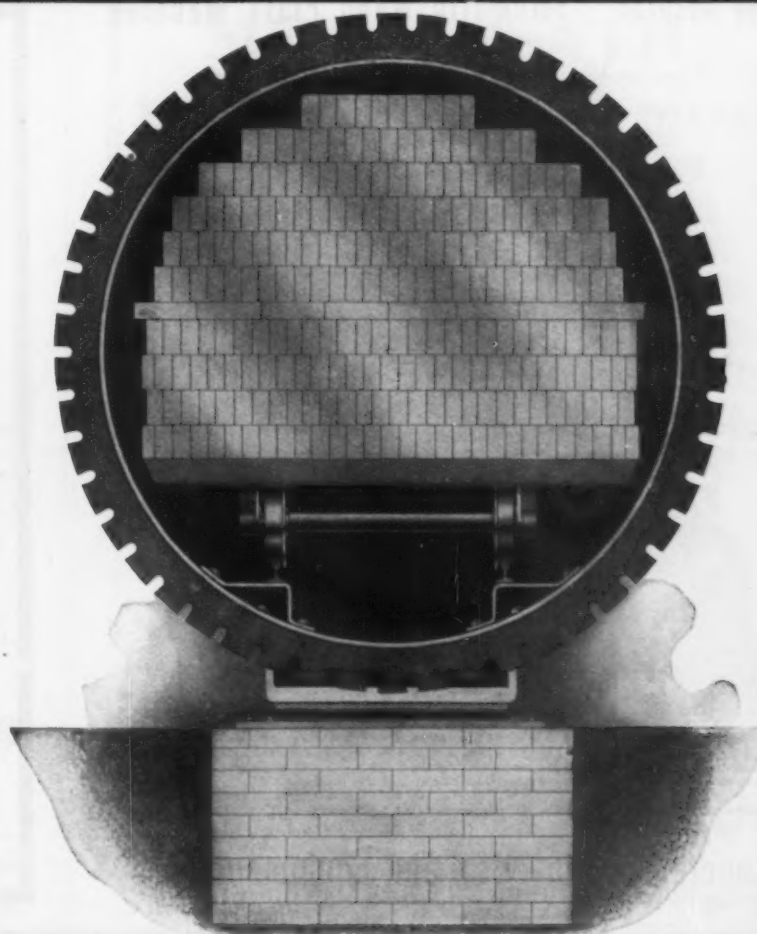
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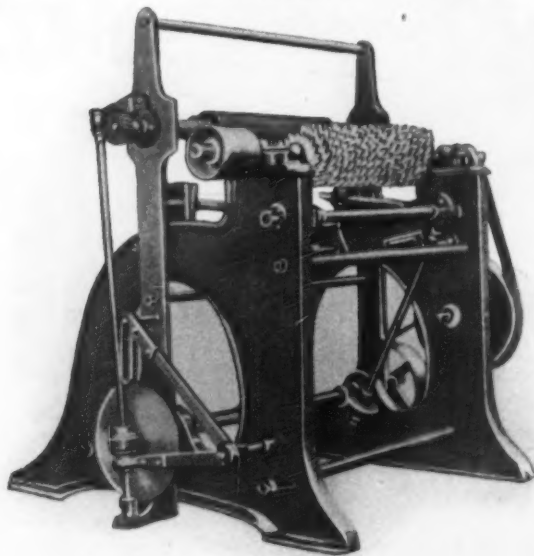
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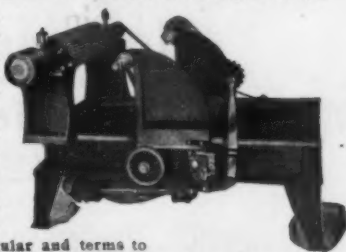
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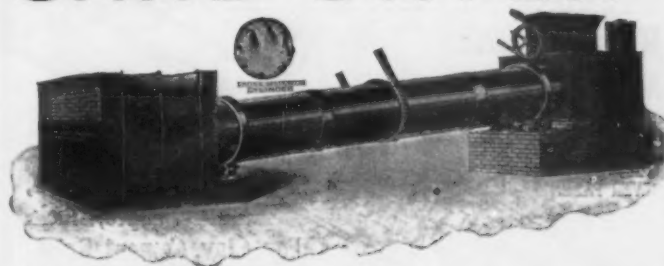
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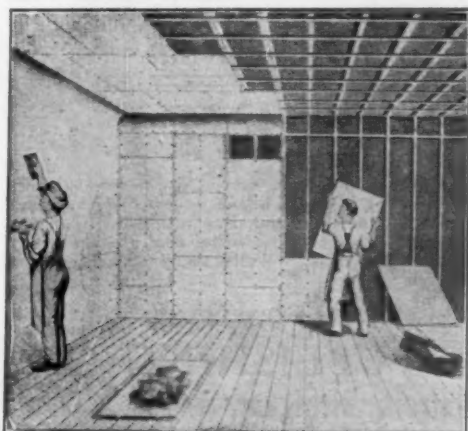


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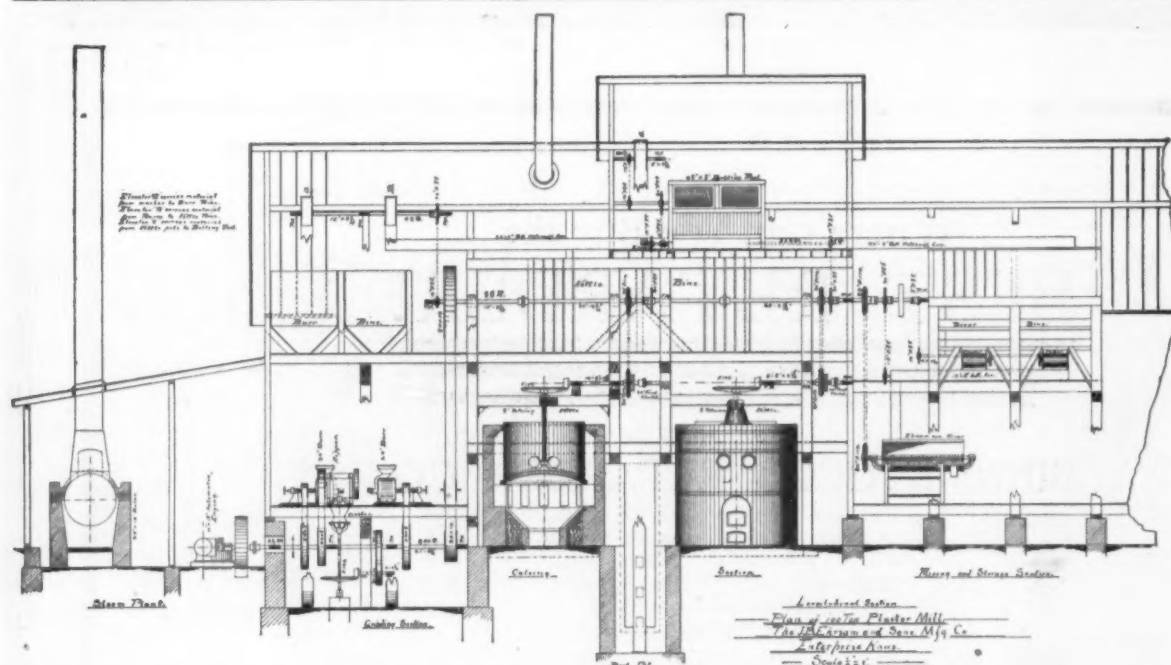
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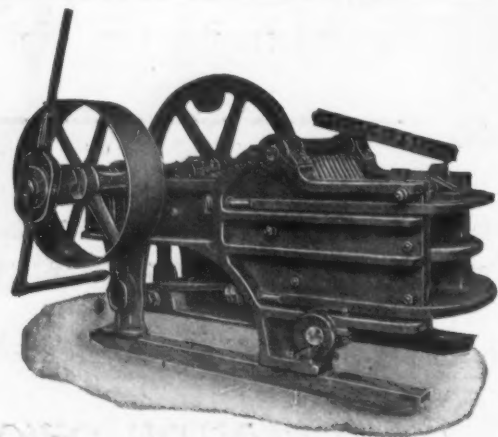
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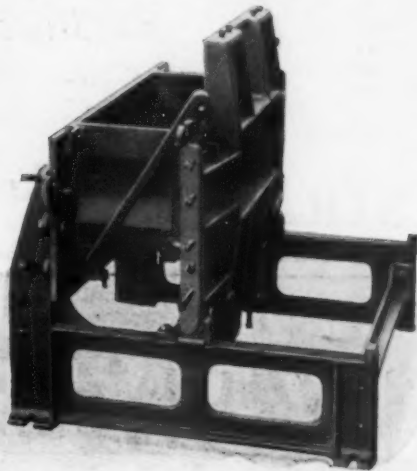
17 Huron Street, GRAND RAPIDS, MICH.

Tell 'em you saw it in ROCK PRODUCTS.



UNIT

GET THE BEST



Our 1906 model FACE DOWN MACHINE makes blocks hollow or solid, all lengths and widths. Makes circle, octagon, hexagon, veneered, crown molding, and many fancy blocks, also water tables. Send for Catalogue No. 5.

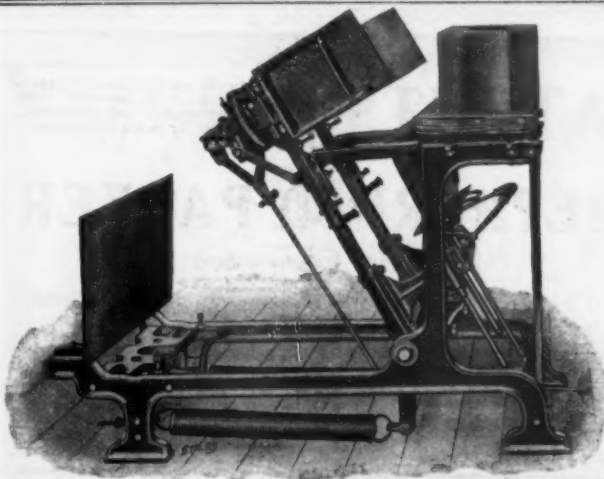
The BOOS AUTOMATIC BRICK MACHINE will make standard brick, plain or rock face, designed especially for facing the brick. Compare its merits with its competitors, the rapidity of its work, quality and uniform size. Two men can readily turn out from 3,500 to 4,000 brick in ten hours.



ADDRESS

COLTRIN MANUFACTURING CO.

140 W. Main Street, JACKSON, MICH.



Automatic Building Block Machines

The wonderful development in the manipulation of cement is largely due to the degree of perfection attained by Block Machines.

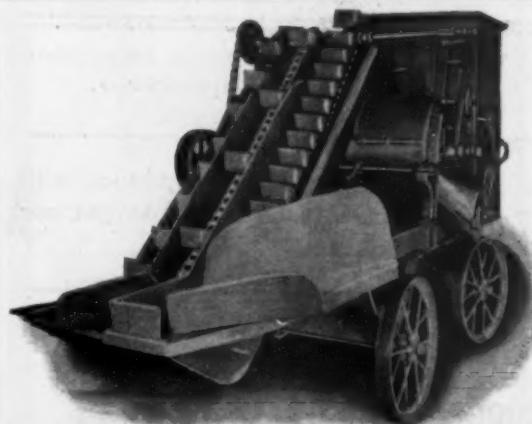
The inventive mind is continually devising improvements, but nothing yet has been produced to equal our Automatic Block Machines.

The simplicity and reliability of mechanism makes it practical and speedy and blocks can be cheaply moulded into the most elaborate designs conceived by the most fastidious.

Recognizing the demand for a more dense and perfect face, our machine was especially designed to produce same, and is made to mould the Block Face-Down. You are thus assured of the very best results in quality and appearance of your blocks.

Our catalogue "M" will be of material interest to you, and we would be pleased to send same on request. Write to-day.

Automatic Building Block Machine Company,
130 Liberty Street, JACKSON, MICH.



THE CONNOLLY

King of All Cement and Concrete Mixers

Maximum Capacity 350 Cubic Yards in Ten Hours. Guaranteed to Do 250.

Operating at one-half (175 cubic yards) its capacity, it furnishes a thorough and perfect 30 seconds Dry Mix of Sand and Cement, followed by a Wet Mix of all ingredients for a like period.
Fed at the ground direct from wheel-barrows it saves 50 per cent Labor in Feeding, and guaranteed to make more and better concrete every hour than any hand fed or fed in the air machine on earth.
Adjustable Buckets Measure Accurately the right proportion of material.
It is its own inspector and a veritable slave driver.
Portable, 14x7, operated by 6 horse power gasoline engine, and fully equipped weighs less than 3½ tons.

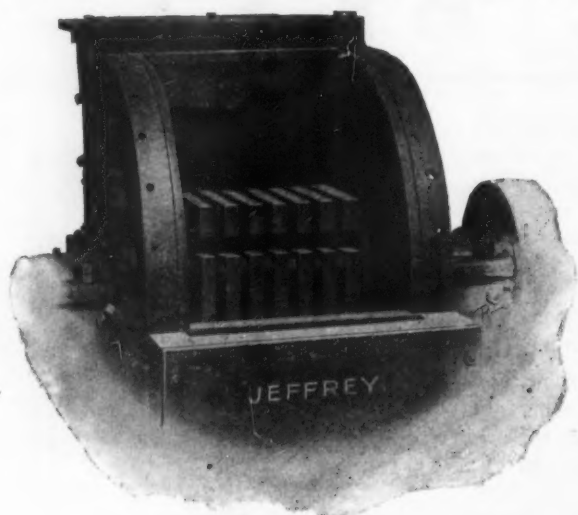
Send for Booklet "D"

We also make and sell the "GRANT," the best little Mixer on the market. It has the mix of the famous CONNOLLY, a capacity of 25 to 40 cubic yards per day. Equipped with its 3 horse power engine weighs 2,000 lbs. Mixes Wet or Dry Concrete, and admirably adapted for Concrete Block Work.

UNITED STATES CONCRETE MACHINE CO., Majestic Building, **Detroit, Mich.**

Tell 'em you saw it in ROCK PRODUCTS.

Jeffrey Swing Hammer Crushers

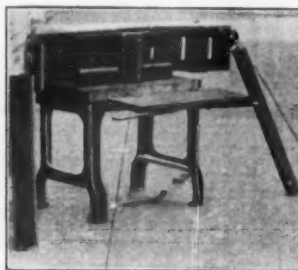


ARE HEARTILY ENDORSED BY

Our Users in Every Locality: Cincinnati Gas & Electric Co.; Bibb Brick Co., Macon, Ga.; Tarbox & McCall, Findlay, Ohio; Casparis Stone Co., Columbus, Ohio; Sheridan & Kirk Cons. Co., Cincinnati, O. and many others.

FREE CRUSHING TESTS MADE BY

THE JEFFREY MFG. CO., Columbus, Ohio, U S. A.
ELEVATING, CONVEYING, SCREENING MACHINERY.



The Common Sense Cement Block Machine

Simple in construction, nothing to get out of order. Easily adjusted to make any size block and any kind of face.

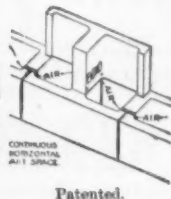
JOHN STRAIT, ROCK RAPIDS, IOWA.

ROTARY DRYERS

WE MAKE THE LARGEST VARIETY IN THE WORLD
More than 200 now in use. Gold Medal at St Louis
NOW USED IN THE GOV. COAL TESTING PLANT
THE C.O. BARTLETT & SNOW CO. CLEVELAND OHIO USA



**HOLLOW
CONCRETE
WALLS and
PARTITIONS
TWO-PIECE
SYSTEM**



Patented.

Would You Like to Learn



"In the Engineering News of Oct. 5th and 12th, 1905, were published the papers awarded the first and second prizes in a widely advertised competition, each of which papers is a very able treatise advocating our system of construction."

THE AMERICAN HYDRAULIC STONE CO., Century Bldg. Denver, Col.

PATENTS

Secured promptly and with special regard to the legal protection of the invention. Advice as to Patentability and Commercial Value Free. Write for Inventor's Hand Book.

SHEPHERD & PARKER

Patent Lawyers

"During the past ten years Mr. Shepherd, of Shepherd & Parker, has obtained for us a great many important patents. We have no hesitation in heartily recommending him to anyone having need of the services of a patent attorney."

HALLWOOD CASH REGISTER CO.

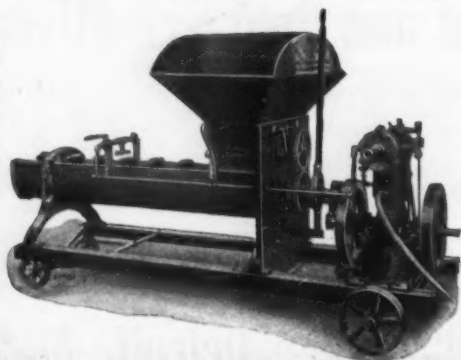
Mr. Parker on November 1, 1903, resigned his position as an Examiner in the U. S. Patent Office to enter this firm.

Address,

146 Dietz Building, Washington, D. C.

DO NOT BUY A MIXER

Without seeing this machine.
Shipped on approval.



We manufacture a full line of Block Machine Mixers, equipped with gasoline or steam power, also Hand Mixer. Do not fail to get our prices before buying. Also see us at Milwaukee.

Eureka Machine Co.,

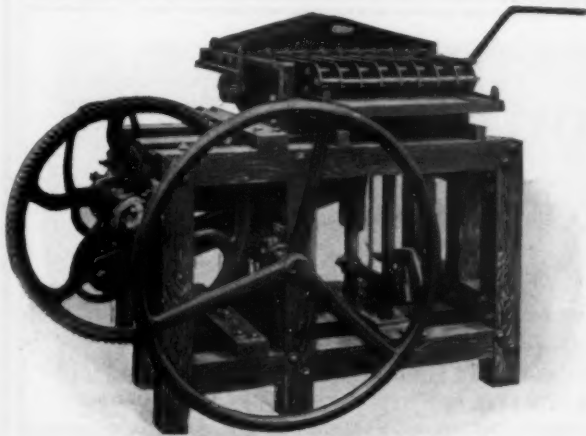
SUCCESSORS TO

Brady Cement Stone Machine Co., Ltd.

North Jackson Street,

JACKSON, MICHIGAN

Tell 'em you saw it in ROCK PRODUCTS.

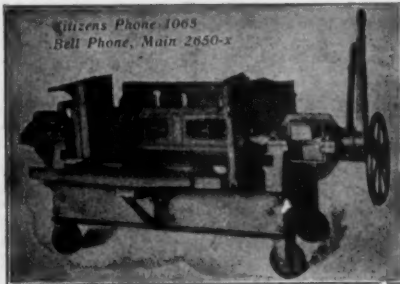


THIS SPACE RESERVED FOR
**The Spears Concrete Brick
Machine.**

LOUISVILLE, KENTUCKY

More to Follow.

THE HAYDEN AUTOMATIC BLOCK MACHINE CO.
112 West Broad Street, (P. O. Box 530.) COLUMBUS, OHIO.



Citizens Phone 1065
Bell Phone, Main 2650-2

Simplest, most complete and swiftest machine on the market. Only perfect machine making face of block in horizontal position, producing most satisfactory work and variety of designs, impervious to moisture. All blocks released and delivered automatically to a support in front of the machine, ready to be removed for drying.

Write us for Catalogue before purchasing.

New York and Foreign Office: HAYDEN AUTOMATIC & EQUIPMENT COMPANY,
26 Gardinetti Street, New York, N. Y.

The Walton Stone Machine

AUTOMATIC, ADJUSTABLE

MAKES DRY WELLS

Makes lengths from 4 to 32 in. and 3, 4½, 6 and 9 in. heights. 10, 12, 14 and 16 ft. radius circles. 30 and 45 degree angles. All widths by lapping blocks. All shapes, lengths and widths made on the same pallet. Reducing cores save material.

LET US TELL YOU

How we save labor, save material, save pallets, save expensive facings, save 8 cents per cubic foot over other machines by our method.

The Walton Stone Machine Co.
2500 East 18th Street, KANSAS CITY, MO.



ON THE HIGH WAVE OF POPULARITY.

**The Ideal Hollow
Concrete Block Machine.**



Not a new machine. Tried and tested over two years. Satisfied users everywhere. Interchangeable to various widths. Adjustable to sixteen lengths. No wheels, cogs, gears, chains or cranks.



Nothing to Clog, Creak or Get Out of Order.

Simplicity, Rapidity, Adaptability, Durability. Face formed in bottom of the mold. Cores withdrawn horizontally by lever. Guaranteed Capacity—Two men, 10 hours, 200 blocks. Portable—Can be carried by two men. Over 200 in use in the State of Indiana alone. The only machine by which can be accomplished the facing of blocks by the Borst System. A business proposition to the maker of blocks. An appeal to the common sense judgment of the builder. In corresponding with us we make our business your interests.

IDEAL CONCRETE MACHINERY CO., South Bend, Ind.

Tell 'em you saw it in ROCK PRODUCTS.



HARMON S. PALMER'S LATEST INVENTION IN
**Hollow Concrete
 Block Machines**

ADVANCING THE INDUSTRY ONE HUNDRED PER CENT.

PRICES REDUCED.

THE ORIGINAL INVENTOR'S



H. S. PALMER

Combination Automatic SELF CLOSING Block Machine

The greatest advancement since the industry was started. BLOCKS OF EVERY SIZE, LENGTH, ANGLE, HEIGHT and CONTOUR produced with astounding ease and rapidity. A MARVEL OF INGENUOUS ATTACHMENTS to the machine which has made more buildings than all infringers and imitators combined. The crystallizing of every merit in the industry to date.

Infringers Prosecuted. Many Injunctions, Many Suits Pending.

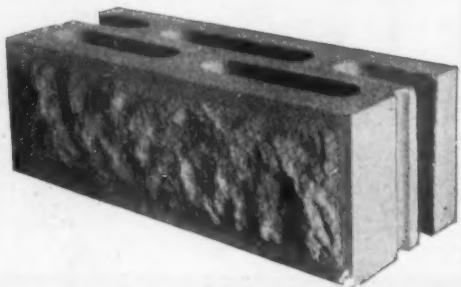
GOOD AGENTS, LIVE FACTORIES AND LAWYERS WANTED.

Harmon S. Palmer Hollow Concrete B. B. Co., Washington, D. C.

Adopted by the United States Government.

WRITE FOR CATALOGUE "T."

Miracle Concrete Products



Take the Lead at the National Convention at Milwaukee.

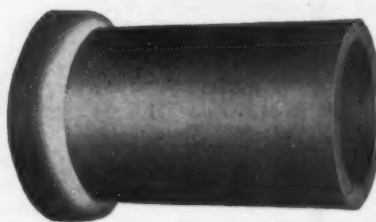
If you weren't there, you better get Catalog "O".

MIRACLE DOUBLE STAGGERED AIR SPACE BLOCKS made their usual "hit". Visitors learned for themselves that frost and moisture cannot penetrate our block.

Our ONE MAN BRICK MACHINE was the center of attraction. Its capacity of 3,000 brick per day was enough to interest anyone, especially if he had a limited capital to invest.

The MIRACLE SEWER PIPE MOULDS also demonstrated their merits. They are the only moulds that can be removed with safety immediately after tamping.

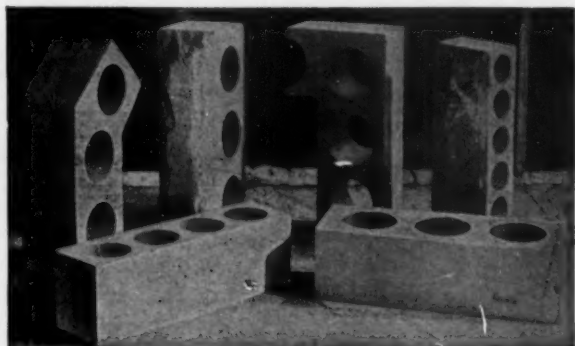
Our SIDEWALK TILE MACHINE is now recognized as the standard machine. It has never failed to do all that was claimed for it.



These Are Four Big Opportunities for You.

Miracle Pressed Stone Co.
 MINNEAPOLIS

Tell 'em you saw it in ROCK PRODUCTS.



The Stevens Cast Stone Has No Rival

IT CAN BE SEEN IN THOUSANDS OF BUILDINGS

Carnegie Libraries, Churches, Schools, Bank Buildings, Business Blocks, and Dwellings. Made without tamping or pressure. Our process overcomes the two great objections to concrete blocks, viz.: the absorption of moisture and artificial appearance.

SEND FOR CATALOGUE

Stevens Cast Stone Co. 808 Chamber of Commerce
CHICAGO, : : : ILLINOIS

Here is what you have been looking for!

Cement Brick Machine

Makes 10 perfect brick per minute with two unskilled workmen.

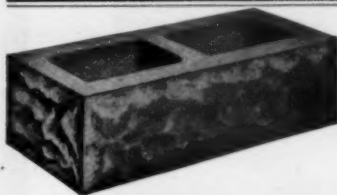
Be your own brickmaker.

Can be changed from plain to ornamental brick or vice versa with no loss of time or extra expense.

E. W. SEAMANS,

25 Fountain Street,

GRAND RAPIDS, MICH.



MOVE THE MACHINE—NOT THE BLOCK

Saves labor of offbearing, loss by damage or breakage. Avoids necessity for heavy and expensive iron pallets. Reduces cost of plant and cost of operation. Everybody knows that concrete should not be disturbed after it is moulded or while it is setting, but this is the only machine with which it is possible.

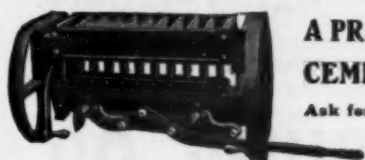
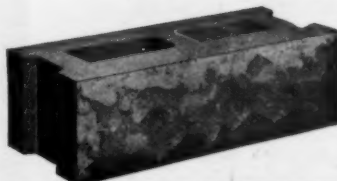
PETTYJOHN

Blocks cost 6 cents to make—Sell for 18 cents. One man can make 200 Blocks per day. Whole outfit costs \$125.00. Figure the profits.

GUARANTEED EVERY WAY—SENT ON TRIAL

THE PETTYJOHN COMPANY

514 NORTH 9th STREET TERRE HAUTE, INDIANA



**A PRACTICAL HAND TAMP
CEMENT BRICK MACHINE**

Ask for Folder D 1

On the Pallet or on the Ground

Ten brick at once, plain or each of any style, shape or design desired by using inexpensive plates or dies with returns. Arch Brick or radius any size circle. Mantel brick a specialty. Uses true concrete with facing, a savings of $\frac{1}{4}$ barrel cement to 1,000 brick. The greatest quantity, the highest quality, the largest variety for the lowest price. Let us explain with a personal letter about a new lucrative field for cement brick and why it interests the dealer in rock products.

Queen City Brick Machine Co., Traverse City, Mich.



Red, Brown,
Buff and Black

**MORTAR
COLORS**



The Strongest and Most Economical in the Market.

Our Metallic Paints and Mortar Colors are unsurpassed in strength, fineness, and body, durability, covering power and permanency of color. Write for samples and quotations.

CHATTANOOGA PAINT CO.,

CHATTANOOGA,
TENNESSEE.

Tell 'em you saw it in ROCK PRODUCTS.

THE PERFECTION

POWER BLOCK MACHINE

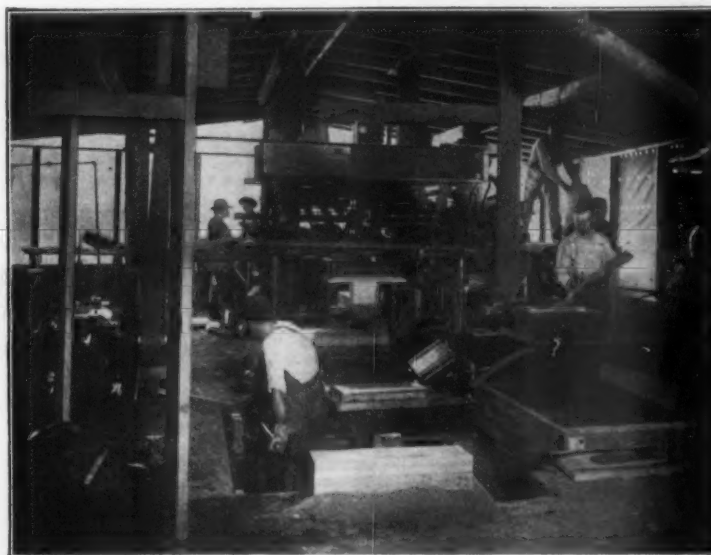
For Making Hollow Concrete Blocks.

100 TON PRESSURE
ON EVERY BLOCK.

600 TO 1000 BLOCKS
PER DAY.

THIS WONDERFUL WORK ACCOMPLISHED WITH FIVE MEN AND INCLUDES ALL THE LABOR FROM THE RAW MATERIAL TO THE FINISHED PRODUCT.

HIGHEST
QUALITY OF
PRODUCT.



GREATEST
SPEED OF
OPERATION.

THE ABOVE CUT SHOWS THE "PERFECTION" POWER BLOCK MACHINE IN OPERATION AT THE MIDWAY PLANT OF THE TWIN CITY RAPID TRANSIT COMPANY'S NEW SHOPS WHERE THERE ARE THIRTEEN MAMMOTH BUILDINGS IN PROGRESS OF CONSTRUCTION, WHICH WILL REQUIRE 600,000 "PERFECTION" POWER BLOCKS. THE WORLD'S LARGEST CONTRACT FOR HOLLOW BUILDING BLOCK. A PROOF THAT THE "PERFECTION" IS BEST.

The Only Machine Making Hollow Block Under High Pressure.

OUR MACHINE MADE THE SAND-LIME BLOCK ON EXHIBITION AT THE SAND-LIME BRICK CONVENTION, DETROIT.

THE PERFECTION BLOCK MACHINE CO.

Kasota Building, Minneapolis, Minn.

WRITE US FOR FULL PARTICULARS.

Tell 'em you saw it in ROCK PRODUCTS.

How Many Thousands of Cement Stone Buildings Will be Erected in 1906?

There's a question Contractors, Builders and all who have to do with building may well ask themselves.

The enormous use of Cement Stone in buildings of all kinds during 1905 has compelled the conservatives in the building trade to "sit up and take notice."

The increase in 1906 over 1905 will be marvelous; better perhaps, to say phenomenal.

Builders can no longer ignore the sterling value of perfectly made cement blocks, either from the standpoint of economy or artistic beauty.

Men with foresight in the building trades all over America and even across the sea are falling in line, and are looking for the best Cement Stone Machine made.

In choosing a cement stone machine don't be carried away with the vociferous shouting and constant clamoring of manufacturers who claim without reason that their machine is the best, or even better than the best.



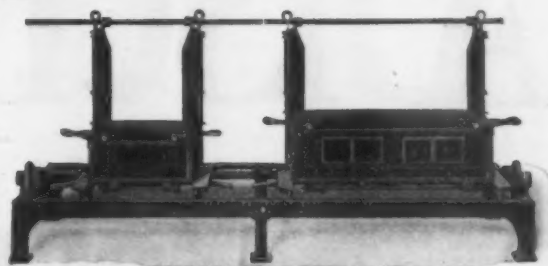
The Hercules 1906 Model Cement Stone Machine Is

Not better than the Best,
But better than the Rest.

A fact that is easy to prove to any intelligent Builder or Contractor who will take the trouble to write for our new beautifully illustrated Catalog.

The simplicity of construction in the Hercules is one great feature—No Cogs, No Chains, No Springs—this combined with its automatic action and accurate mechanism, and the combination arrangement which permits two stones of different sizes to be made on the one machine at the same time is the reason that the Hercules makes more blocks in less time and for less money than any other machine.

The Hercules is an adjustable machine—perfectly and easily adjustable—and that is why it can make blocks ranging in size from two inches to six feet, accurately and perfectly, cutting the item of labor in two.



Being simple in construction, the Hercules is easily kept clean and does not require high priced labor to operate.

In the Hercules the plate that makes the face of the stone rests on the bottom. This allows the operator to tamp directly on the face, enabling him to get a very clear and accurate impression of the design which comes out as natural as cut stone. Tamping directly on the face also permits the builder to make a stone with a fine, clean cut face and a coarse back—a clear saving of material.

If you are going to own a machine you will want the one that will make the strongest blocks, blocks with a crushing strength equal to natural stone.

Well, that's just why we call this machine **The Hercules**—the name denotes strength, wonderful strength—and the Hercules Machine does not belie its name, for with our method of tamping with a big flat tamper the Hercules makes stronger stone than can be made on any other machine.

The Hercules makes solid blocks and hollow blocks. The hollow blocks are made with more air space than those made on other machines, which, as you can readily see, means a great saving in material which means money.

You can smile at competition if you have a Hercules; smile right out loud if you choose, for you can make blocks much cheaper, much stronger, much more natural looking than any competitor who uses any other machine.

You can make a larger number of designs too; over fifty half-tone designs of facings are shown in our new Catalogue.

On the One Machine, **The Hercules**, you can make in addition to solid and hollow stone: Water Tables, Window Sills, Lintels, Coping, Steps, Flagging and the like.

We want you to send for our new Catalogue L, show our **1906 Model**—we want to prove to you that the Hercules will do anything that's worth doing, better than any other machine, and will do other things besides.

Send for Catalog L today. Lumber is going higher—natural stone won't go lower, that's a sure prophesy, and Cement Stone is the building material of the future. Catalog L will tell you lots of things you ought to know about stone making.

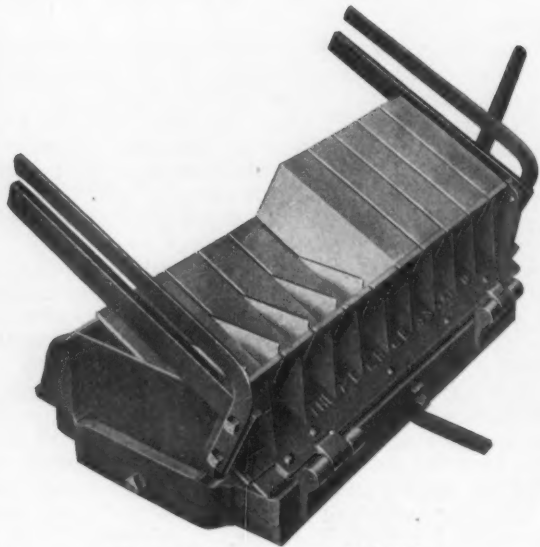
Century Cement Machine Company, 179 W. Main Street,
ROCHESTER, N. Y.

THE LATEST DEVELOPMENT

A Sensation in

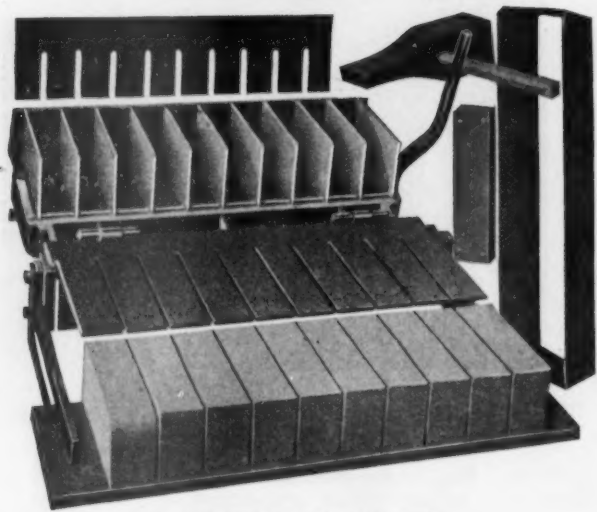
Practical—Durable—Pro-

"PEERLESS" CEMENT



PEERLESS CEMENT BRICK MACHINE.

Showing the PEERLESS containing only five bricks and partly open with pallet removed to show action of machine. In working, the pallet is slipped between the levers at each end of the machine to support the brick when machine is fully open, as in cut No. 2.



PEERLESS CEMENT BRICK MACHINE.

Giving you a view after delivering a load. At the top stands the steel facing plate, used only in facing end brick. At the right are, tamping mallet, collar and float. On the pallet are ten complete bricks, one showing a rounded corner. Attachments for all forms of ornamental brick furnished extra, and easily adjusted.

A simple and inexpensive **One Man Machine**, made of iron and steel, producing perfect face or common brick of any color with sharp edges and of uniform size. One man has made on this machine, over **3,000** perfect brick, in ten hours. Prices right. **SEND FOR CATALOGUE.**

The Peerless Brick Machine Co.

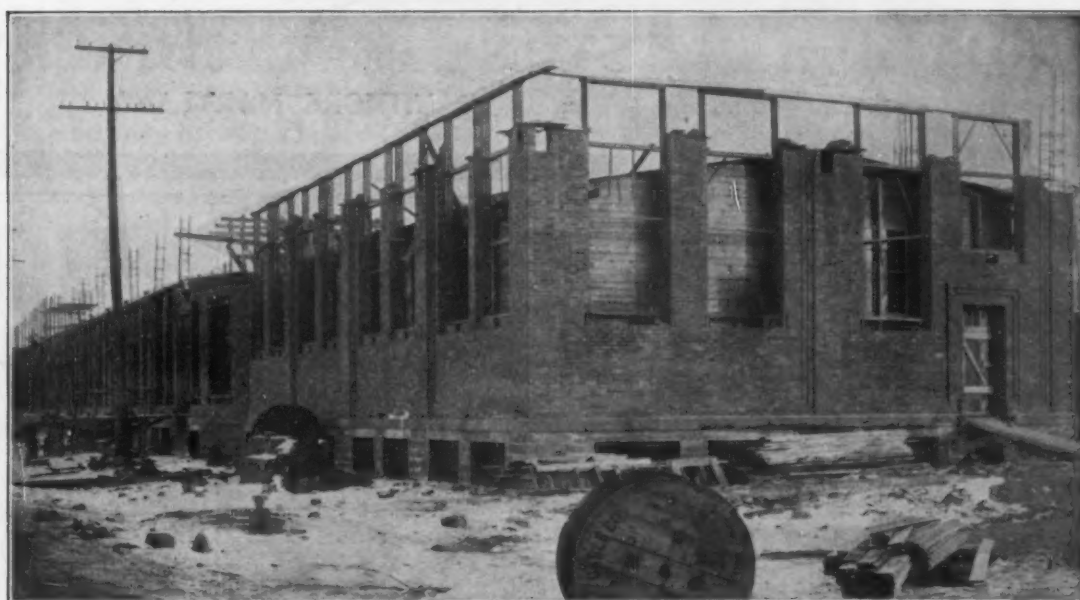
Tell 'em you saw it in **ROCK PRODUCTS.**

EMENT COMPLETED

Cement Brick

onomical—Profitable

ET BRICK MACHINE



CAR HOUSE OF THE TWIN CITY RAPID TRANSIT CO.

GEORGE COOKE,
GENERAL CONTRACTOR,

527 Boston Block, Minneapolis, Minn.

Peerless Brick Machine Co., December 19, 1905.
100 Lumber Exchange, City.

Gentlemen:—We have used five of your brick machines during the past season, making the brick for the Twin City Rapid Transit Co.'s shop buildings at Snelling and University Avenues, St. Paul, and the results have been in every way satisfactory to us. In fact, we consider your machine the speediest and most efficient brick machine on the market.

Yours truly,

C. E. COOKE, Supt.

This cut gives a view of the car house 172x360 which is one of the 12 buildings now being constructed by the Twin City Rapid Transit Co. at Snelling and University Avenues, midway between Minneapolis and St. Paul, under direction of its contractor, Mr. George Cooke, of Minneapolis.

These buildings when completed, will compose the most extensive street car shops in the world. They have adopted and are now using the PEERLESS CEMENT BRICK MACHINE to manufacture all the brick used in these buildings, a description of which follows:

Car House, 172x360; Mill, 75x200; Store House, 100x300; Power House, 50x100; Paint Shop, 126x300; Machine Shop, 150x200; Smith, 50x200; Foundry, 60x200; Transfer Table, 90x900.

Three others, dimensions not given.

Company, Lumber Exchange, Minneapolis, Minn.

Tell 'em you saw it in ROCK PRODUCTS.

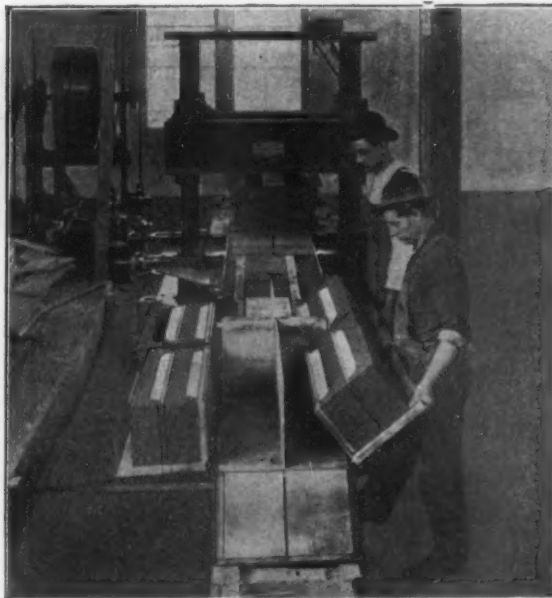
PRINT IN BINDING

The Fisher Hydraulic Stone System

**A Success
A Money Maker
No Experiment**

=====
This outfit consists of a genuine HYDRAULIC PRESS, and carefully constructed machinery, and has a SHIPPING WEIGHT OF 25,000 POUNDS.

The cut illustrates the Fisher machine operating and delivering eight angular blocks at one pressing, requiring less than one minute to pound them into shape, under a 200-ton pressure.



**The Only Machinery
Put Out for the Manu-
facture of Concrete Blocks**

=====
This outfit is capable of PRODUCING 1,500 CUBIC FEET of material, formed into the shape desired, in ONE DAY'S WORK.

APPLY FOR FURTHER INFORMATION.

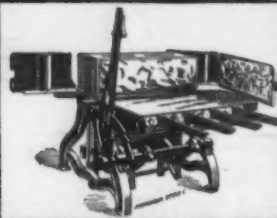
FISHER HYDRAULIC STONE AND MACHINERY CO.

Builder's Exchange Building

::

BALTIMORE, MARYLAND

High Grade Concrete Block, Brick, Post and Mixing Machinery



"We Have The Leaders." "The Big 7"

- 1 Normandin Concrete Block Machine (Face Side)
- 2 Peninsular Concrete Block Machine (Face Down)
- 3 Gemaco Concrete Block Machine (Face Side)
- 4 Champion Concrete Veneer Block Machine (Face Down)
- 5 Favorite Sand Cement Brick Machine
- 6 Systematic Concrete Mixer
- 7 Universal Cement Line, End and Brace Post Machine

We are in the business. We can give you the best value for your money. Write us. Don't delay. Get started. Concrete

posts, blocks and brick are in demand. We solicit your trade because we can please you. Our machines are standard; adopted twice by the United States Government. Highest awards Universal Exposition, St. Louis, 1904, and Portland Exposition, 1905.

CEMENT MACHINERY COMPANY, JACKSON, MICHIGAN U.S.A.

ARCHITECTURAL ORNAMENTS

—Pleasing Effects Can be Produced by the Use of Our—

BALL AND SPINDLE MOLDS



A GOOD PAIR—Dever's Ball and Spindle Molds.

The cost is light, but rich, effective beauty is secured to your work. No plant can be called complete without them. We provide for the necessity that has been holding the cement industry back. Write to

DEVER'S CEMENT WORKS, CASSOPOLIS, MICHIGAN.

DO NOT WAIT TILL OTHERS GET THE EQUIPMENT, IT WILL PAY FOR ITSELF ON ONE JOB.

Tell 'em you saw it in ROCK PRODUCTS.

Pauly's Concrete Wall Machine

For Monolithic and Reinforced Concrete Construction.

The only machine that has yet successfully done away with false work in concrete construction, and sold upon a positive **WRITTEN GUARANTEE**.

The latest improvement that has been put on this machine reduces the labor cost from 40 to 50 cents on every perch.

Immensely Successful Everywhere

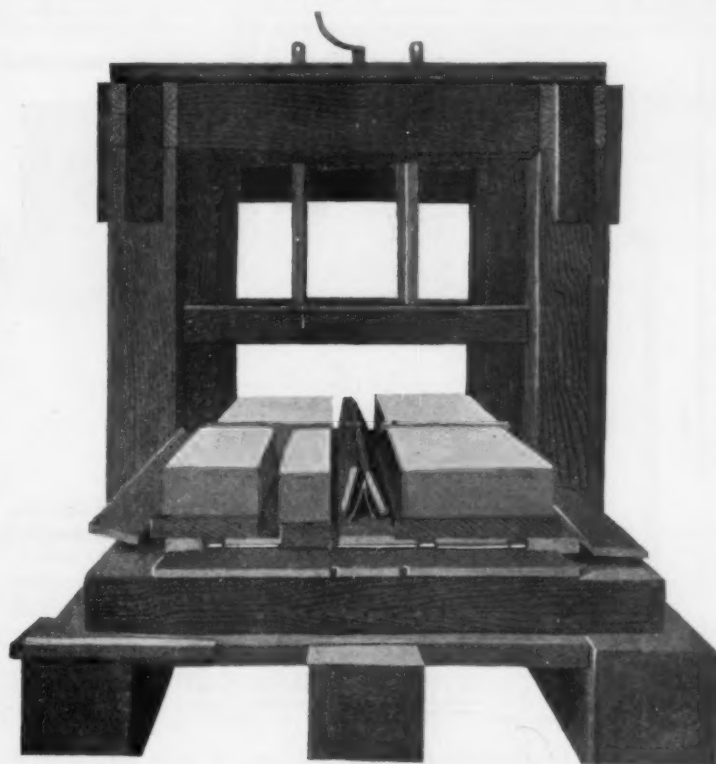
NOT A COMPLAINT WHERE INTELLIGENTLY USED.

THE LATEST AND BEST—A DISTINCT ADVANCE.

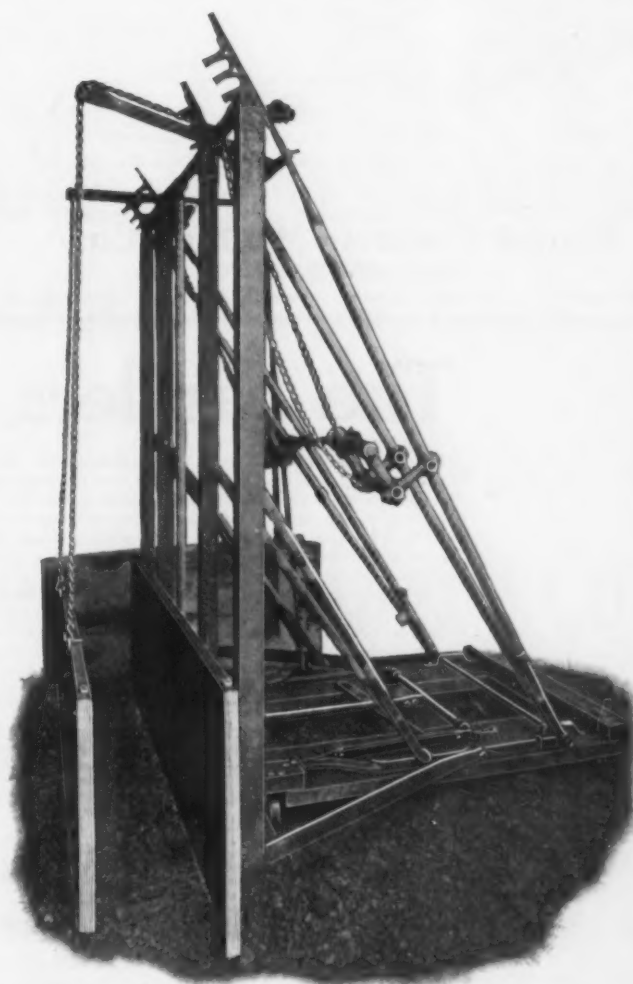
Pauly's Hollow Concrete Veneering Block Machine

FOR ACTUAL BROKEN ASHLAR CONSTRUCTION.

Complete plants equipped with hand or power press and outfit of molds for every size block required in the system. Drawings furnished for steaming chamber, giving details for slides and racks, or specially designed steaming cars and tracks supplied when desired. Successful, practical operation demonstrated every day with big profit.



PAULY'S HOLLOW VENEERING BLOCK MACHINE.



PAULY'S HOLLOW VENEERING BLOCK MACHINE.
READY TO BEGIN THE CONSTRUCTION OF A WALL

This is the Machine that has Long Been Needed to Make Perfect the Concrete Building Block Idea.

Can make blocks all one size 12 x 24 inches with mortar pointing space of $\frac{1}{2}$ -in. subtracted, or broken up into any fractional size desired. The bed of moulding press is so constructed that it is impossible to leave out the mortar space calculation.

A GREAT SAVING OF MATERIAL IS GUARANTEED.

The labor cost in properly equipped plant in daily operation has been determined at $1\frac{1}{2}$ cents per surface foot, when producing hollow concrete veneering tile.

This is not a hypothetical calculation, but actual results obtained and checked against the pay roll in the inventor's plant, which is literally crowded with business, and turning away good orders for blocks every day.

Freezing Weather has no Effect in operating by the Pauly System.

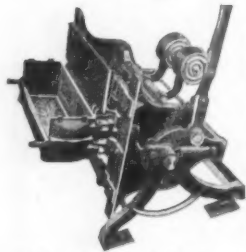
HANDSOME ILLUSTRATED CATALOGUE SENT FREE. WRITE TO THE

Concrete Stone and Sand Company, Youngstown, Ohio.

CAPITAL STOCK, \$100,000.00.

Tell 'em you saw it in ROCK PRODUCTS.

The Latest and Highest Achievement in Concrete Block Machinery

"The Winget 1906 Model"

This machine has the great distinction of being the only UNIVERSAL machine on the market. It is universal because it perfectly combines all the three different kinds of machines into ONE. It makes everything that all the others can make and a number of things they cannot make.

It is first an UPRIGHT machine, which has never been equaled in its advantage of wide range of adjustment, great speed, economy and simple operation.

It is secondly a FACE DOWN machine which excels all others in points of convenience and practicability and especially in that it gives a finished molded surface to all sides of the block, a great advantage which no other possesses.

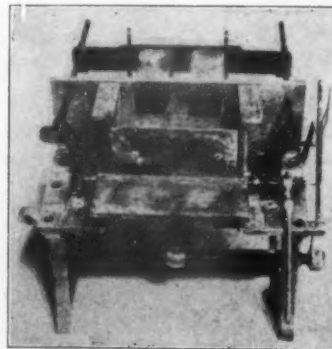
In the third place it makes TWO-PIECE blocks, and produces two in one operation. Although it covers the widest range and the several phases, it is remarkable in that its movements are all controlled by one simple automatic lever. This machine meets with nothing but universal praise.

The only Concrete Block machine to receive award at the Portland Exposition was the Winget 1906 Model.

For full particulars regarding the Winget System of Concrete Machinery including power tamper and mixer, address the

**Winget Concrete Machine Co.,
COLUMBUS, OHIO.**

BRANCHES: New York Chicago St. Louis Pittsburg Los Angeles Greensboro, N.C.

The "Reed" Machines are in the Lead

TIME IS MONEY! Why not save TIME and make MONEY? Why use a MACHINE that you tear down and set up every time you manufacture a block? Why "NOT" use a MACHINE when adjusted for the dimension of block desired which manufactures blocks and NOT WASTE TIME in tearing down and setting up for every block of the same dimension produced?

The "REED" Face Side and Face Down Block and Brick machines are simple, rapid and adjustable. Blocks and Bricks are raised or turned out of the machines.

Capacity 350 to 600 blocks and 6000 brick in ten hours. If interested it will pay you to write us at once.

DOWN FACE MACHINE
The WICHITA COAL AND MATERIAL CO., Wichita, Kan.

The Sanders Brick Machine

For making sand and cement brick, sand and lime brick, any brick, all shapes and sizes. This machine makes the finest face brick of any machine on the market: every brick is perfect with fine, smoothface and sharp, square edges, every brick a pressed brick. This machine makes plain brick, ornamental brick, molded brick, all shapes and sizes, building blocks, rock face, tool face, panel face, plain face with V joint and brick face, fancy belt courses, corner blocks, combination brick cornices, fine porch columns, porch piers, lattice work, wall trimmings, chimney tops, paving blocks, archways, wainscoting and tiling for vestibules and hallways, stair steps and risers figured and paneled, for inside and outside stairs, also many figures in terracotta work can be made on this machine, and made any color by using the chemical coloring.

Two men can make 4,000 to 6,000 brick a day, 1½ bbls. of cement to 1½ yds. of sand will make 1,000 good brick; 2 bbls. of cement to 1½ yds. of good, fine sand will make 1,000 fine face brick, style and variety of work unlimited. It pays every time to buy the best machine. With good sand and good cement you only need one of our machines to make the best and finest cement work that can be made. Send for our catalogue in which you will see cuts made from work on this machine—seeing is believing—it is acknowledged by experts to be the best machine on the market for cement work. Be sure that you are right, then buy our machine which makes everything right.

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**Latest Improved, Handiest,
Quickest Adjusted.**

Will make Blocks any size
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Sills, Angles, Gables, Culvert
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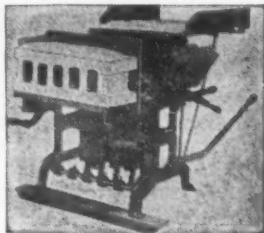
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STRINGER MACHINE CO., Jackson, Mich.

IT IS A QUESTION OF ECONOMY

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Our American mixer is good—All that the name implies—New, modern, up-to-date, honest, to be depended upon, and a "Mixer" just like any genuine American citizen. Compare it from any standpoint with the other kind and the result is like comparing the Yankee with the Russian.

A REAL AMERICAN

It feeds while running, discharges instantly, is self-cleaning, does not "ball" or "roll" and MIXES. Send for catalogue "I".

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The Standard Continuous Concrete Mixer

"The Mixer that Measures and Mixes"

"You fill the Hoppers, the Mixer does the rest."

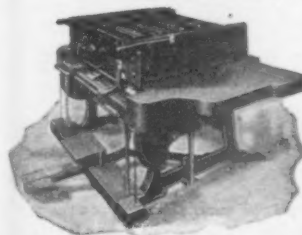
Continuous Automatic, Feed Exact Proportions.

Materials first Dry Mixed then "Tempered." Output instantly variable from 0 to Maximum at will of operator, thus insuring Fresh Material for each Block. Feeds Sand and Gravel Dry or Wet.

Write for description and prices to

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These Cuts Show Our 1906 Model No. 4 Chicago Machine.



Cut on left shows Chicago No. 4 machine, set to mould 4 blocks at one time, each 6x32-in. Cut on right shows 2 blocks moulded, each 14-in. wide and 32-in. long. Any size or shape of block required in ordinary building construction can be moulded on this machine. We ship our machines on approval, and send our demonstrator to start your plant, or we will pay your railroad expenses here and return to look over our line and choose what you want. We manufacture more than 20 different styles of block machines, ranging in price from \$15.00 up. We are the largest exclusive manufacturers of block machines, moulds and tools. Make us a visit and we will show you more than 40 different styles of machines. **OUR FACE DOWN MACHINES HAVE NO EQUAL.** If we cannot please you, we pay your railroad expenses just the same, and you are out only your time. We have machines for making any size or shape of block, and any style of air space; we have side face and face down machines. We build **MACHINES**, not crude, cast boxes. Since our ad. first appeared in ROCK PRODUCTS, we have sold more than 100 outfits. We have equipped more than 2,000 plants and will furnish you list of names and addresses of users of our machines on request. Send us your order for one of our \$75.00 outfits; we will ship on approval, freight paid, and if not satisfactory after five days' trial, notify us and we will remove it. Write today for our 50 page catalogue, enclose 25 cents and we will mail you formula for waterproofing and coloring blocks. We will furnish enough of our waterproofing and coloring to waterproof and color 100 sq. ft. of surface for \$1.00. State color wanted when ordering. Be sure and tell us you saw it in ROCK PRODUCTS.



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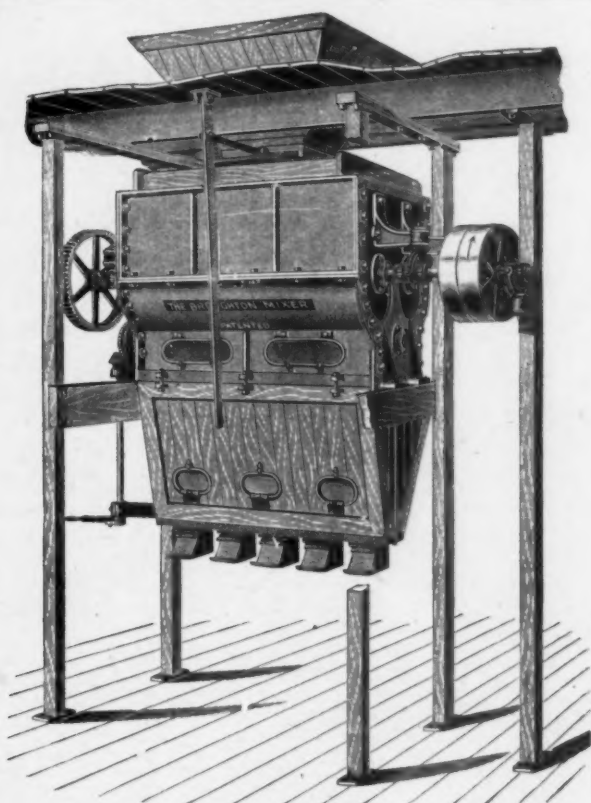
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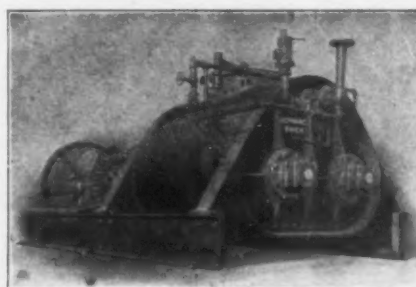
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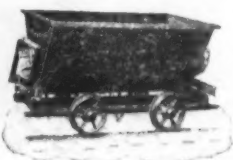
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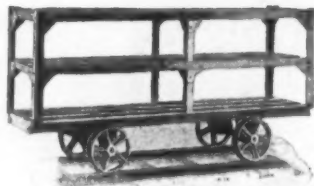
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